February 17, 1947

STEEL

The Magazine of Metalworking and Metalproducing

IN TWO SECTIONS, SECTION ONE ESTABLISHED 1882 EDITORIAL INDEX, PAGE 51

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PRE-COATED COLD ROLLED STRIP STEEL

Custom Designed

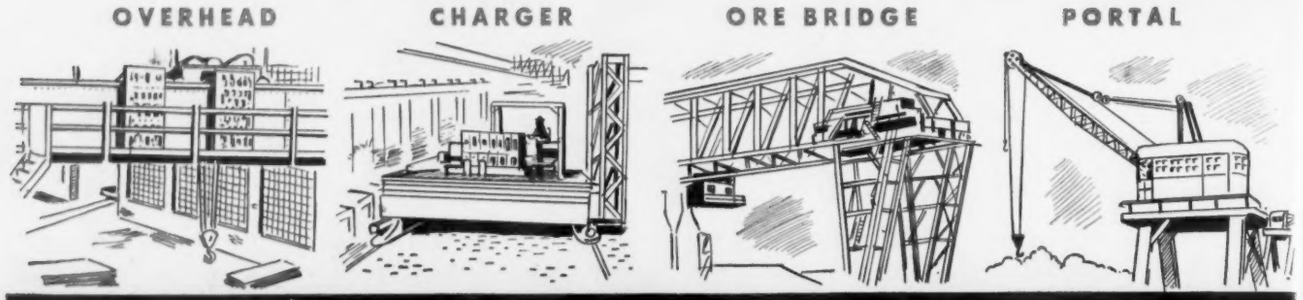
for COST SAVING • FUNCTIONAL PURPOSES
ULTIMATE FINISH • RUST RESISTANCE
EXTRA DIE LIFE • SOLDERING and BRAZING
BASE FOR FURTHER PLATING

• ELECTRO-COATED ZINC, COPPER, NICKEL AND BRASS... HOT DIPPED TIN AND SOLDER . . . LACQUER COATED IN COLORS... UNCOATED PRECISION STRIP... CARBON AND ALLOY SPECIALTIES

Thomas Strip

COLD ROLLED STRIP STEEL SPECIALISTS

THE THOMAS STEEL COMPANY
WARREN • OHIO



EVERYTHING UNDER CONTROL

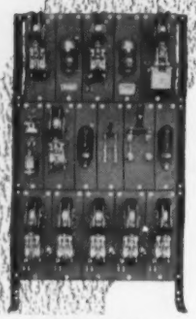
FOR DIRECT CURRENT CRANES

For many years, EC&M has led in the development of extremely sturdy, highly efficient electrical equipment for cranes . . . equipment that meets the requirements of good cranes.

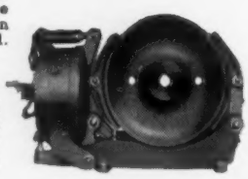
EC&M engineers have designed into this equipment that extra margin of safety and quality which insures uninterrupted service . . . which also includes features appreciated by maintenance men and operators as aids in their daily tasks.

Many users recognize the symbol, EC&M, as a standard of value and specify this equipment whenever new cranes are purchased or when revamping existing installations. These users know that control, only a small part of the initial cost, is a vital part of every crane.

They know, too, by experience, it pays to standardize on EC&M Control for cranes.



Moving loads at high speed and spotting loads accurately are two of the many advantages of EC&M Magnetic Control which appeal to crane operators and help them turn out work promptly. Bulletin 921.

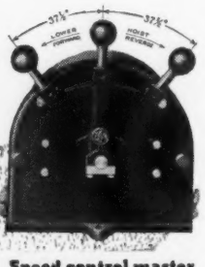


To stop and hold the load, E&CM Brakes are quick-releasing, fast-setting and long-lived. Bulletin 1004.

To prevent overhoisting, enabling the operator to do better work by removing the fear of an accident from his mind—Youngstown Safety Limit Stops. Bulletin 1032.

To protect cranes, this single unit Protective Panel contains overload relays, knife switch and push-button-operated main line contactors. These units provide low voltage protection to the entire crane and permit disconnecting power to all motors in an emergency. Bulletin 1021.

For disconnecting power when leaving the crane—an EC&M Disconnect Switch of the manual-magnetic type for easy opening or closing of the circuit to the main collector-bars. It reduces replacement-part problem since parts are associated with magnetic control. Bulletin 1024.

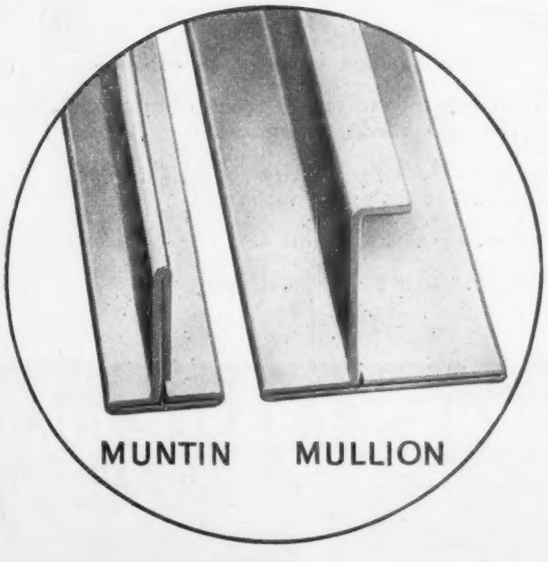


Speed control master switches — cam type and of narrow width to permit close mounting of several in front of the operator within easy reach. Short throw from off to full-on position reduces motion by the operator. Bulletin 1190.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

Manufacturer of CASEMENT WINDOWS

USES COLD-FORMED SHAPES



Supplied in several customer-furnished designs, four of which are shown here, and in lengths up to 30 ft, Bethlehem Cold-Formed Shapes are providing many advantages to a manufacturer of casement windows. Cut to length and welded into place, they make possible neat-looking, sturdy windows, inexpensive to produce, easy to install.

And the benefits of Bethlehem Cold-Formed Shapes are by no means limited to window-making. For scores of manufacturers in diversified industries are continually coming up with new, widely varied uses for these economical shapes.

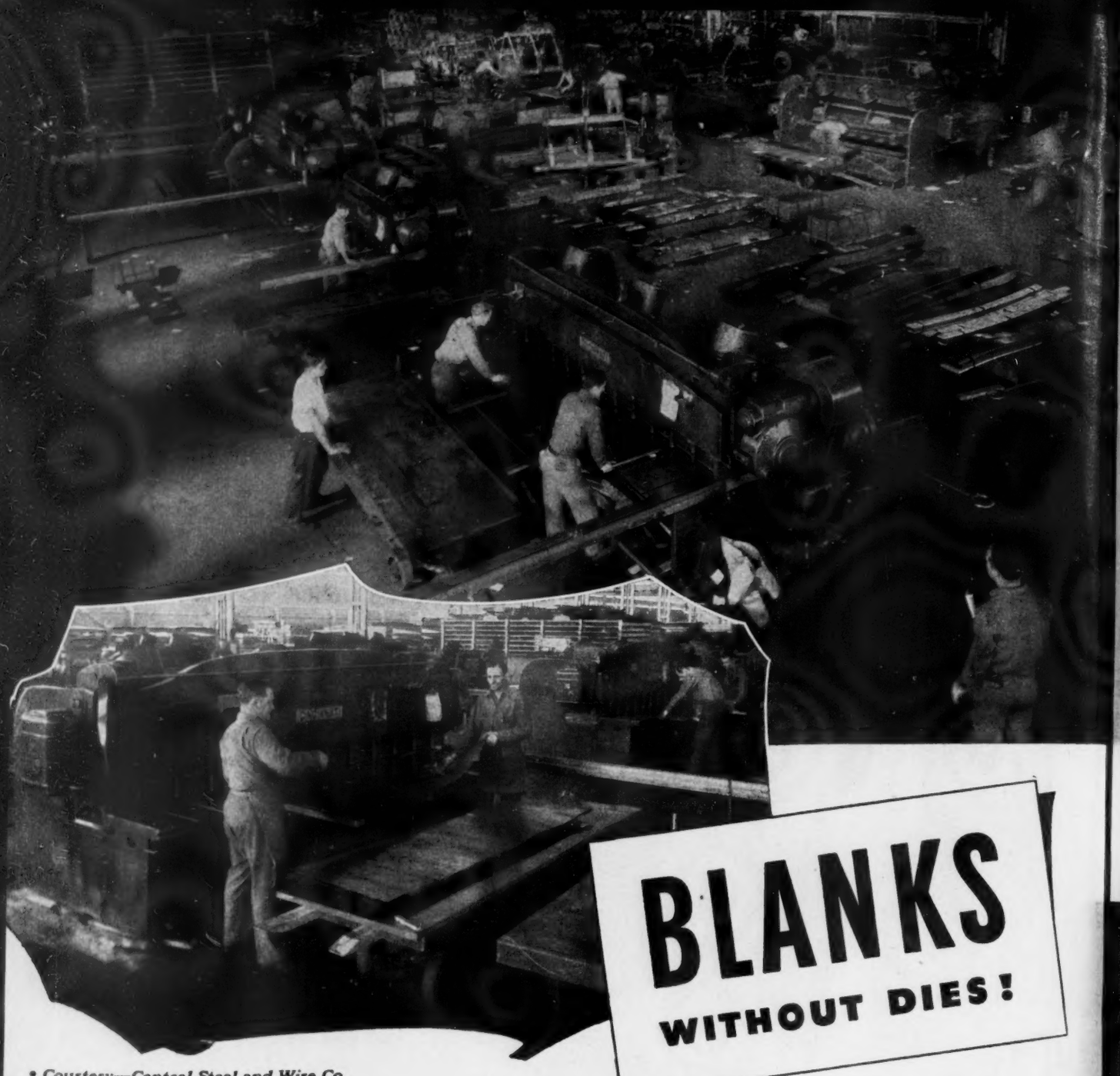
Made from steel sheets, strip, or plates, Bethlehem Cold-Formed Shapes are excellent for use wherever hot-rolled shapes are either uneconomical or impractical. They are formed on presses, brakes or rolls in a wide variety of styles, in any length, and in all gauges from 7 to 24.

We've an illustrated eight-page booklet on Bethlehem Cold-Formed Shapes which you'll find both interesting and helpful. For your copy, get in touch with the nearest Bethlehem district office. Or write direct to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★



BLANKS
WITHOUT DIES!

• *Courtesy—Central Steel and Wire Co.*

Cincinnati Shears have reduced costs sharply in the production of straight-sided blanks.

The exceptional accuracy of Cincinnati Shears—the ability to cut to thousandths of an inch—the ability to cut straight—all mean accurate, true blanks without dies.

The flexibility of Cincinnati Shears—the power to produce endless sizes of straight-sided blanks—the rapid, convenient gauging—all contribute to the cost reduction.

Our representative will be glad to discuss Cincinnati Shears with you.

Write for Catalog S-4 for a description of the Cincinnati Line of All-Steel Shears.

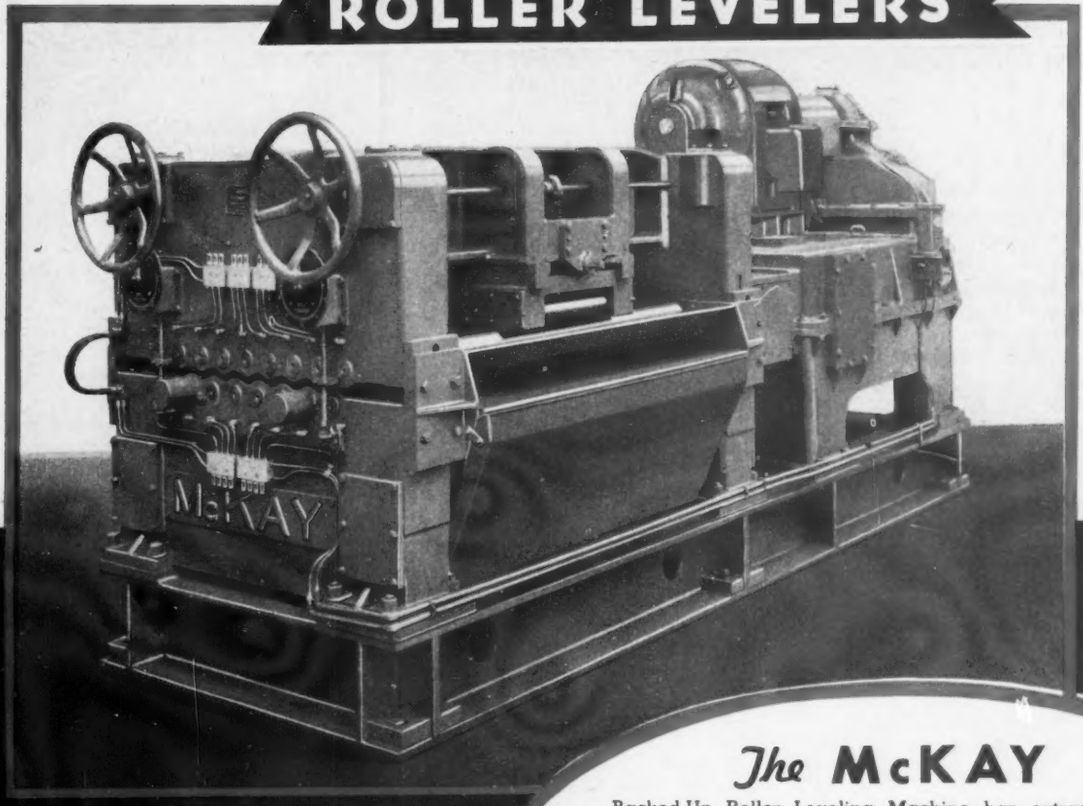
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

McKAY

BACKED-UP ROLLER LEVELERS



FEATURES

Compact design reduces required floor space.

All adjustments are readily accessible to the operator.

Accurate indicating dials are provided for the screwdowns.

Alloy steel Helical gears are used throughout — fully enclosed and running in oil.

Drive is through Universal couplings.

One-shot lubrication system.

Rugged construction insures continuous performance and low maintenance cost.

The McKAY

Backed-Up Roller Leveling Machine has extraordinary rigidity because its small diameter work rolls are supported by backing-up rolls. This type of leveling works the sheet more thoroughly.

Sheets processed on this type of leveler are strain relieved to a greater extent and have far superior stamping and drawing qualities than those processed by the ordinary leveler.

The McKAY MACHINE Company

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

PERFORMANCE
RUGGEDNESS
PRECISION AND
SAFETY

Behind the Scenes...

Golden Steel

Art Allen, our editor-on-wheels from the motor city, picks up a small classified ad from the *Detroit Times* proving there is no shortage of sheet steel if you know where to buy it and are willing to pay for it. The ad offers 50 tons of 20 gage high tensile deep drawing sheets, a commodity which at the moment resembles hens' teeth as far as most manufacturers are concerned. Want to buy some? You can get it for only $300 per ton! Net ton, that is. The stuff isn't gold plated, in fact it isn't even silver plated, but it's one you can tell your grandchildren some day when you're blowing off about the good old days.

Nothing Is New

Seems like our comments here always return to plague us. Not that we object to mail. Heavens, no! Write all you want—we love it. However, it gives us an inferiority complex to find out that some of our pet discoveries are old hat to many superior intellects among our readers. We're still getting a lot of letters from Nigerian-letter-receiving people. That must be a cause celebre at Cleveland Pneumatic Tool Co., since we received letters from three different people out there. We are also still receiving answers to the ladder-and-alley problem, the coconut (!) problem, and last week we heard from New Jersey Zinc Co. that thixotropic, which we gleefully discovered a few weeks back, is no new word either to them or to the paint industry. They say it refers to a liquid which is lighter after you stir it up than it is before. We can't understand that one, but it sounds like something a magician might make good use of.

New Brain Rakers

Speaking of the ladder-and-alley problem, Walter Carroll of Republic Steel says he knows about people who are praying we get lumps in our mashed potatoes for perpetrating that one. Our potatoes are at the moment completely lumpless, thanks to the efficient operation of our electric mixer. If it suddenly goes on the blink, we'll know that all the prayers are answered. However, we're hoping that all the praying people had better luck with the simple little ball bearing problem of last week. As thousands of you saw at a glance, there were 4970 balls in the pile. Here's an old one which may be new to some of you. Seems a gal was timid about revealing her true age, so she propounded the following gem to confound her questioners: "When I was born, my sister was ¼ as old as my mother. She is now 1/3 as old as my dad. I'm now ¼ as old as my mother, but in four years I shall be ¼ as old as Dad." Now, just to confound all of you, we'd like to know not how old was the gal but which two people in her family have the same birthday? No, honest, we aren't kidding. It can be done!

Re: Relatives

According to L. B. (Bethlehem) Shapleigh, one of our nephews has forsaken the primrose path to become an editor. At least, he says, the editor of the October issue of the Cornell *Widow* was listed as "Etaoin Shrdlu '46." When the editors up on the ninth floor read about this they will undoubtedly make a mental note to beware of hiring any Cornell '46 men for fear he might turn out to be another Shrdlu. Which reminds us, the learned Dr. E. Shrdlu, our brassy-nosed old uncle, is still making trouble for Frank Colby's daily newspaper column on English as she is spoke. He recently gave out with some definitions which nobody could understand, just to let us know he's still in business.

The Pres. Has Arrived

We don't often talk about our own people in this column, but we thought perhaps we might make a special exception in this case. It has been the custom over the past ten years or so in this company to award an engraved watch to all employees who reach the 30-year mark in service. The award is made by the president, E. L. Shaner, who is also the author of those excellent editorials you read each week in STEEL. Mr. Shaner hasn't missed a one, having given out every 30-year award since the custom began. This time, however, he had to miss one and the task was assigned to George O. Hays, our vice-president and general manager. Himself a 30-year veteran, Mr. Hays was quite proud to welcome into the magic circle none other than Mr. Shaner, who had been wondering how he was going to pass the watch from one pocket to the other while shaking hands with himself at the same time.

Shrdlu

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STEEL
Vol. 120—No. 7 February 17, 1947

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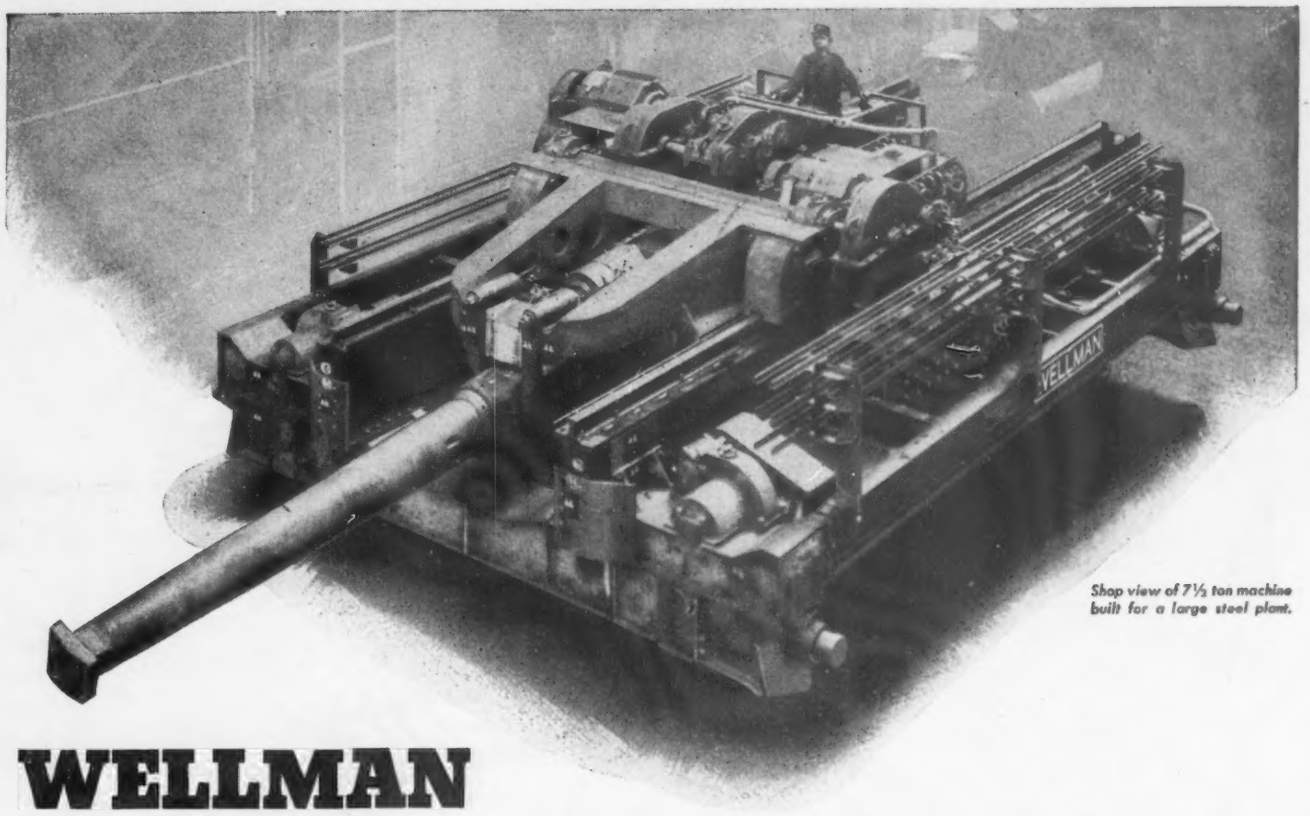
Editorial Staff on Contents Page

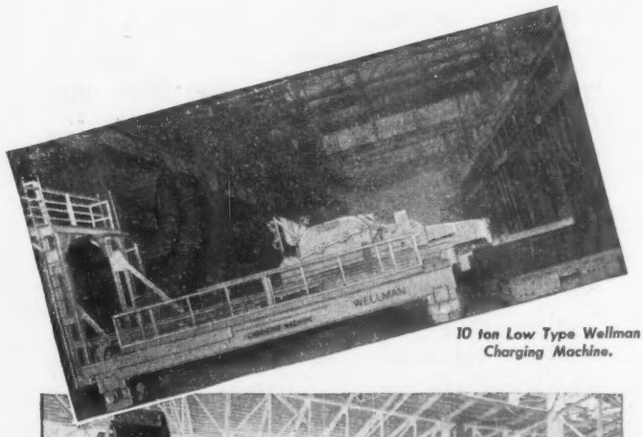


Shop view of 7½ ton machine built for a large steel plant.

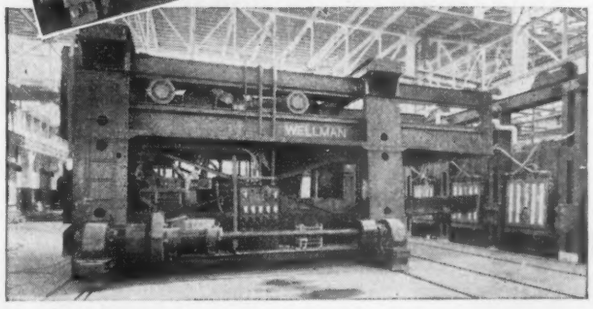
WELLMAN

MANUFACTURES THE MOST COMPLETE LINE OF

CHARGING MACHINES



10 ton Low Type Wellman Charging Machine.



5 ton High Type Wellman Charging Machine.

Wellman originated the labor saving, mechanical charging of open hearth furnaces and now makes most complete line of improved, modern chargers. Some features: one-piece furnace annealed cast steel trolley frame . . . air tight gear cases . . . modern roller bearing design (optional) . . . bridge framework with main and auxiliary girders. Wellman makes Low Type (5, 7½, 10 and 12 ton) High Type (5 ton) Crane and Revolving Types, also charging machines for heating furnaces, and manipulators for forging presses and hammers.

WELLMAN WILL BUILD IT!

Car Dumpers • Coke Pushers
Clamshell Ore Buckets
Ore Bridges • Mine Hoists
Gas Producers • Soaking Pits
Skip Hoists • Wharf Cranes

THE WELLMAN ENGINEERING COMPANY
7029 Central Avenue Cleveland 4, Ohio

MODERN STEEL FOUNDRY AT BUFFALO, N.Y.

The WAR ASSETS ADMINISTRATION invites sealed proposals for purchase or lease of the Government-owned facilities which were added to the existing steel foundry of the Otis Elevator Company, Buffalo, New York, to increase its wartime production of steel castings.

These additions gave the complete plant a rated capacity of approximately 1,800 tons per month. And they are offered now—for sale or lease—with the understanding that the Otis Elevator Company will transfer to the successful applicant its privately owned portion of this scrambled facility under terms.

Your inspection of the entire plant is recommended; and arrangements for such inspection can be made now by contacting the War Assets Administration, Office of Real Property Disposal, 17th Floor, 40 Wall Street, New York City.

Written, sealed proposals will be received by War Assets Administration, Post Office Box 2707, Washington 25, D. C., until 2:00 P. M., (EST), April 9, 1947. At that hour, all proposals will be publicly opened and read at the address given below.

Proposals should be submitted in duplicate, with the following notation on the envelope: "Sealed Proposal, Otis Elevator Company, War-39". Information on how to prepare and submit a proposal may be obtained from any War Assets Administration Regional Office.

Credit terms may be arranged for the purchase of these Government-owned facilities. The War Assets Administration reserves the right to reject any or all proposals.

Address all inquiries to:

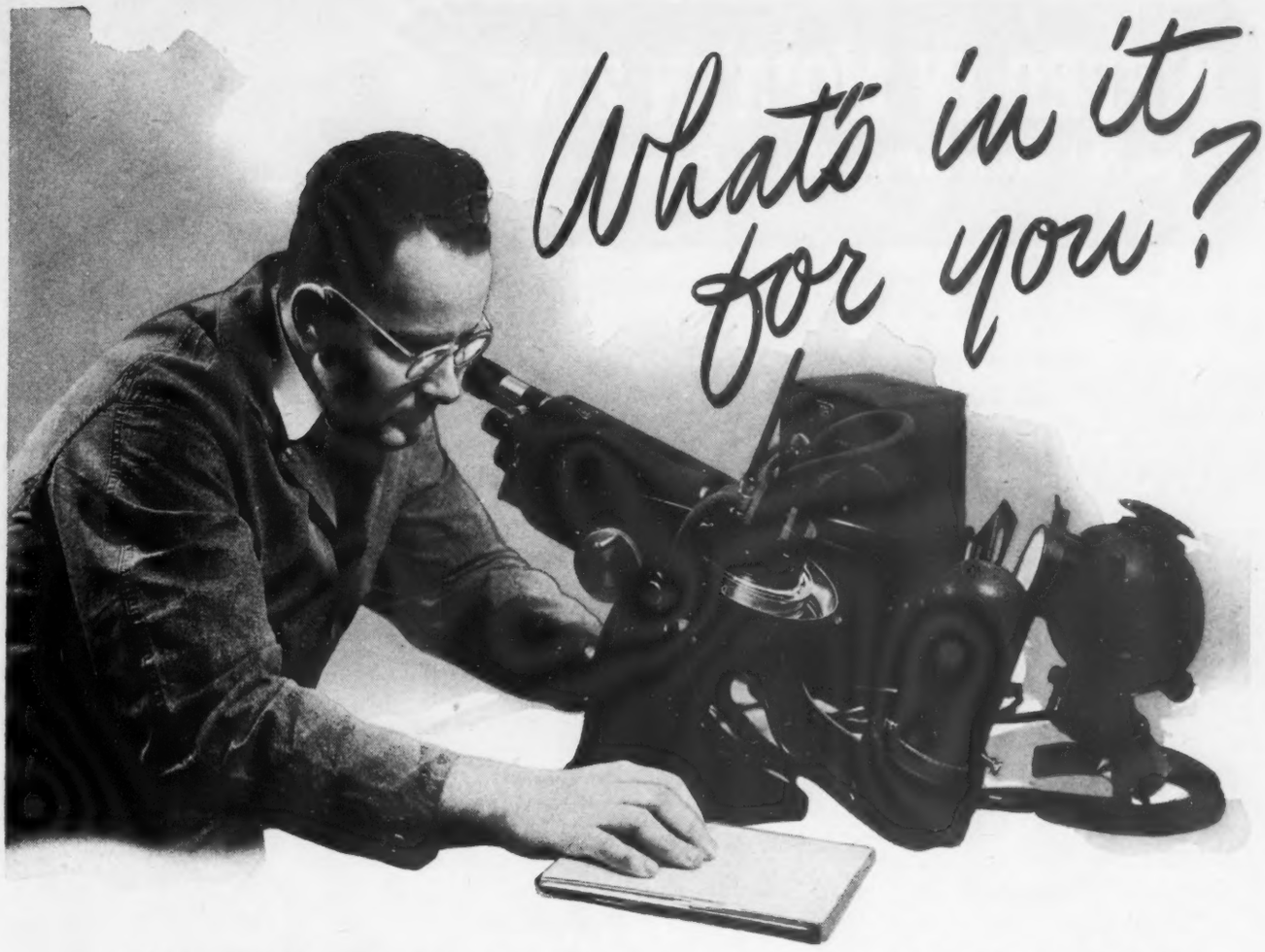
GOVERNMENT OWNED SURPLUS PLANTS

1045-T

WAR ASSETS ADMINISTRATION

OFFICE OF REAL PROPERTY DISPOSAL

IRON AND STEEL BRANCH, INDUSTRIAL DIVISION, 425 SECOND ST., N.W., WASHINGTON, D.C.



In this special machine there's plenty for you as a user of industrial lubricants. With the modern Refractometer, Sinclair Laboratory specialists keep posted on what's in your industrial lubricants. It shows them what properties to strengthen, so the finished product will perform best in any specific application.

Index of refraction and specific dispersion, determined by the Refractometer, is a measure of the chemical structure of lubricating oils. By use of such instruments as the Refractometer, Sinclair maintains important control points in the manufacture of dozens of industrial lubricants.

Such laboratory research and control gives you assurance that Sinclair lubricants are made correctly to provide the kind of special protection your valuable machinery requires.

Sinclair Metal Working Oils

For General Alloy Steels:
WILKUT OILS

For Tough Alloys:
AUTOKUT OILS

For Water Emulsions:
SATISOL and TOOLTEX

For Honing:
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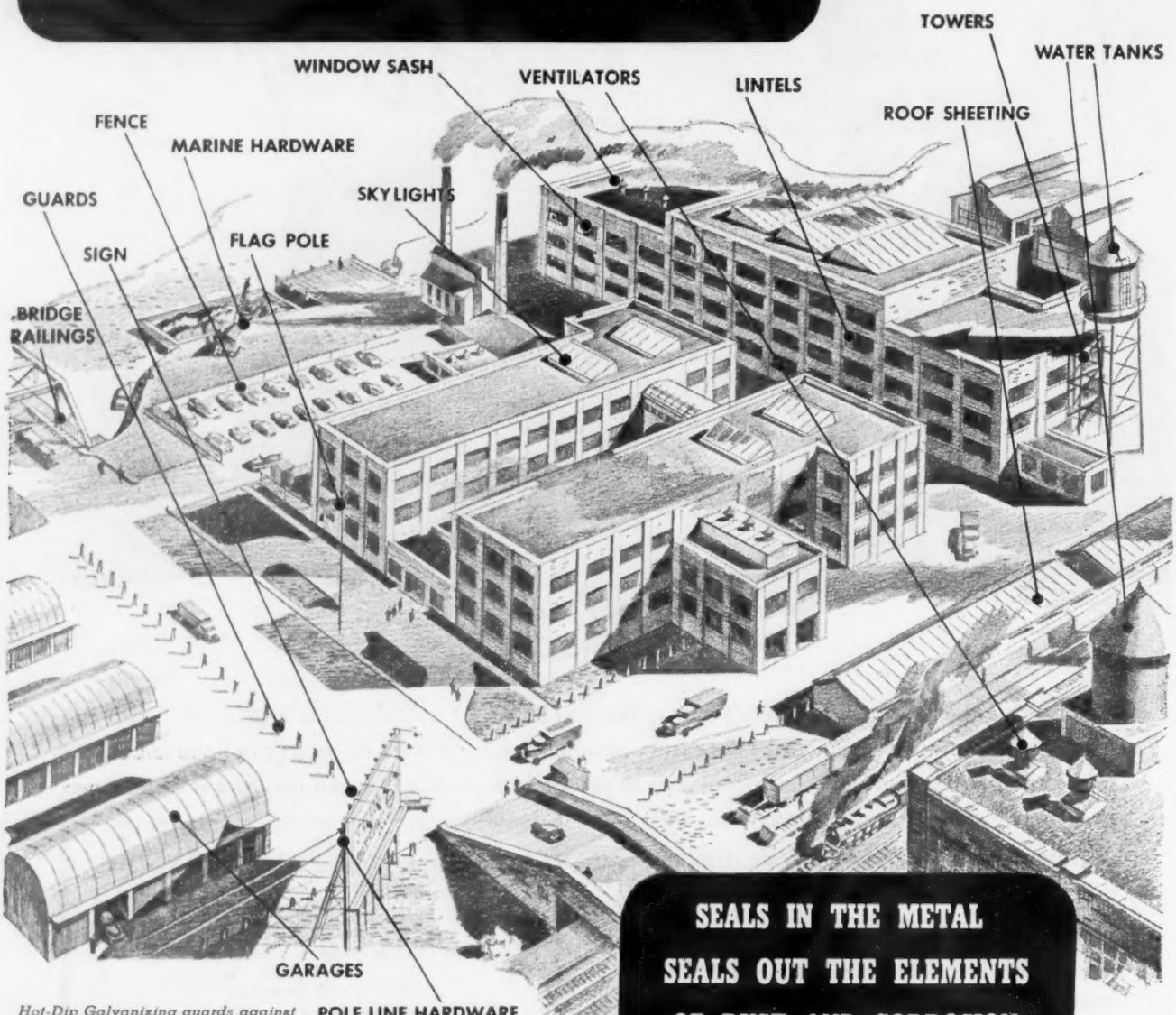
SINCLAIR

Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE

DIPPED IN MOLTEN ZINC

For the utmost in Rust Prevention



Hot-Dip Galvanizing guards against the costly ravages of rust and corrosion. Millions of maintenance dollars are saved annually through the protection of Hot-Dip Galvanizing.

SEALS IN THE METAL
SEALS OUT THE ELEMENTS
OF RUST AND CORROSION

Factory Management, Engineers, and Plant Owners *know* what maintenance and replacement annually cost industry. Hot-Dip Galvanizing has long demonstrated the tremendous savings that can be effected by protecting expensive structures and installations from the elements that cause rust and corrosion.

Hot-Dip Galvanizing, through the high temperatures involved in the process, creates a positive fusion of zinc with base metal. This bond holds the best possible protective zinc coating to the base metal.

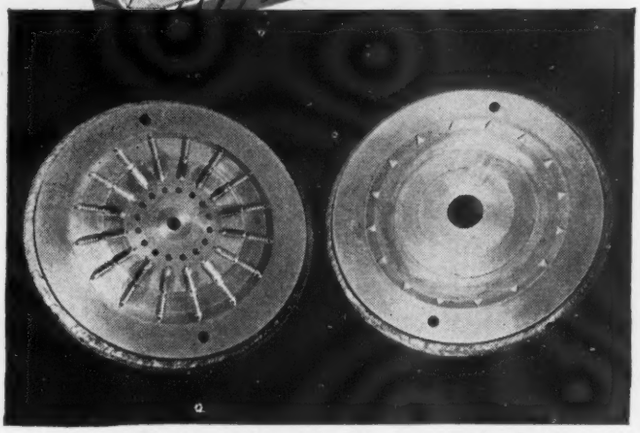
Records prove, throughout the years—under every climatic condition—that where metal is sealed in zinc it cannot rust.

Write regarding rust and corrosion problems to American Hot Dip Galvanizers Association, Inc., First National Bank Building, Pittsburgh 22, Pennsylvania.

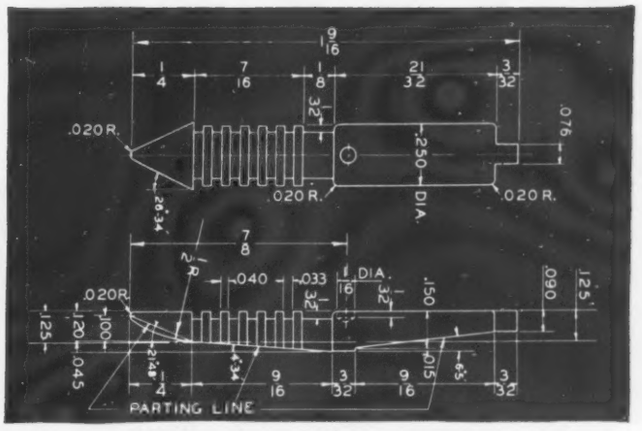
For the best Zinc Coating

use hot-dip GALVANIZING

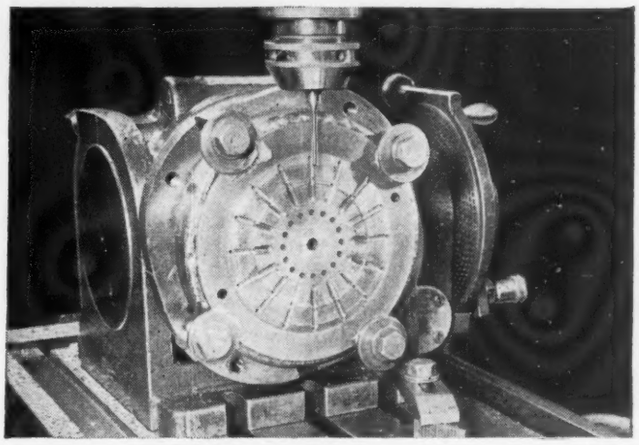
How to Mill an intricate 16-Cavity Injection Mold complete.. averaging 8¾ hours per cavity!



1 **FAST!** Both halves of this 16 cavity injection mold for an ink feed part for desk pens milled complete and ejection pin holes spotted in 140 hours! That's typical performance of a Kearney & Trecker — Milwaukee Model 2D Rotary Head Milling Machine on difficult mold making jobs.



2 **DIRECT!** These multiple contours were transmitted direct from print to mold block. No fussing with templets or models. One cavity accurately located and each operation successively duplicated after indexing on a dividing head. That's the Rotary head method of "multiple origination."



3 **ACCURATE!** Single setup reduced chance for error. Operator relied on built-in precision control and measuring devices for precise end results. Ejector half tipped 90° and special cutter used to square groove corners.

Job Data Courtesy of
Senghusch Self Closing Inkstand Company

4 For more facts of how you can get Fast, Direct, Accurate results on other mold, tool, die, pattern, toolroom and general production work, using the Rotary Head Method, write for bulletin 1002C on the Model 2D Rotary Head Milling Machine.

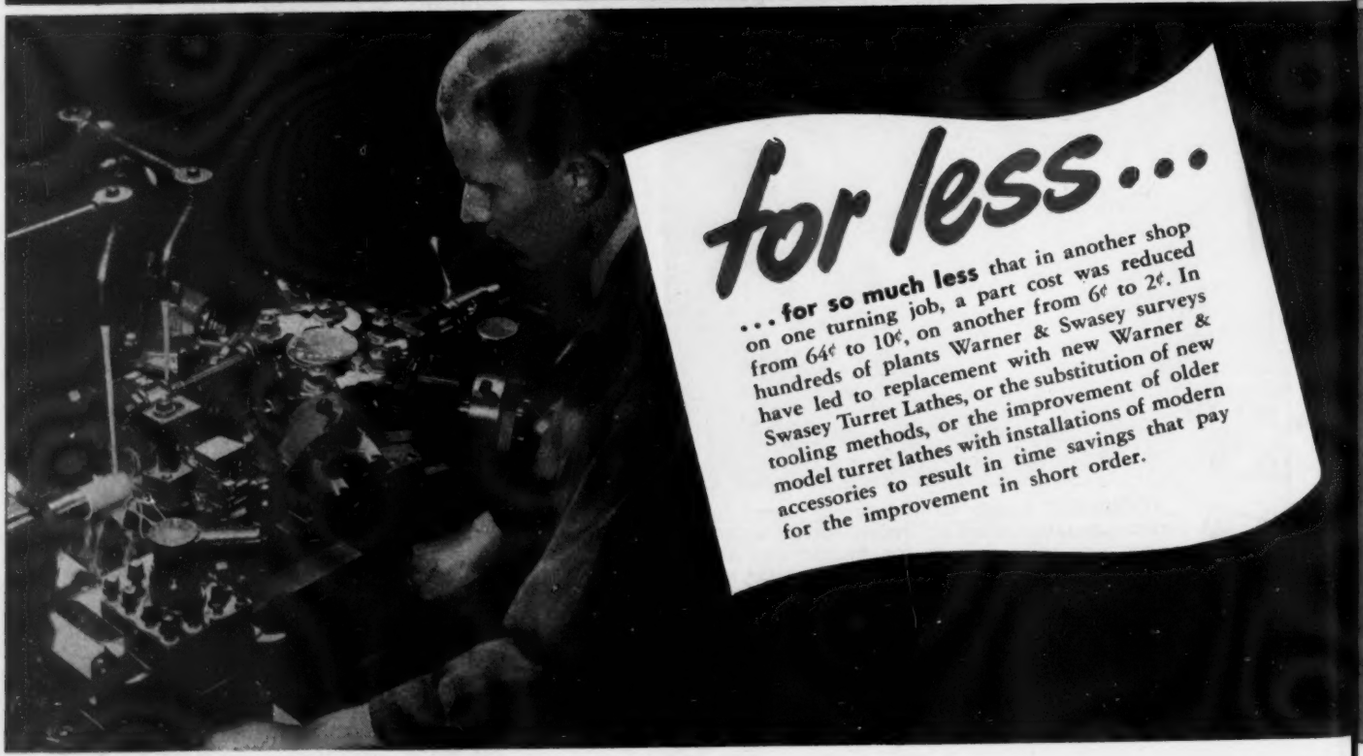
KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN

4718

You can

better

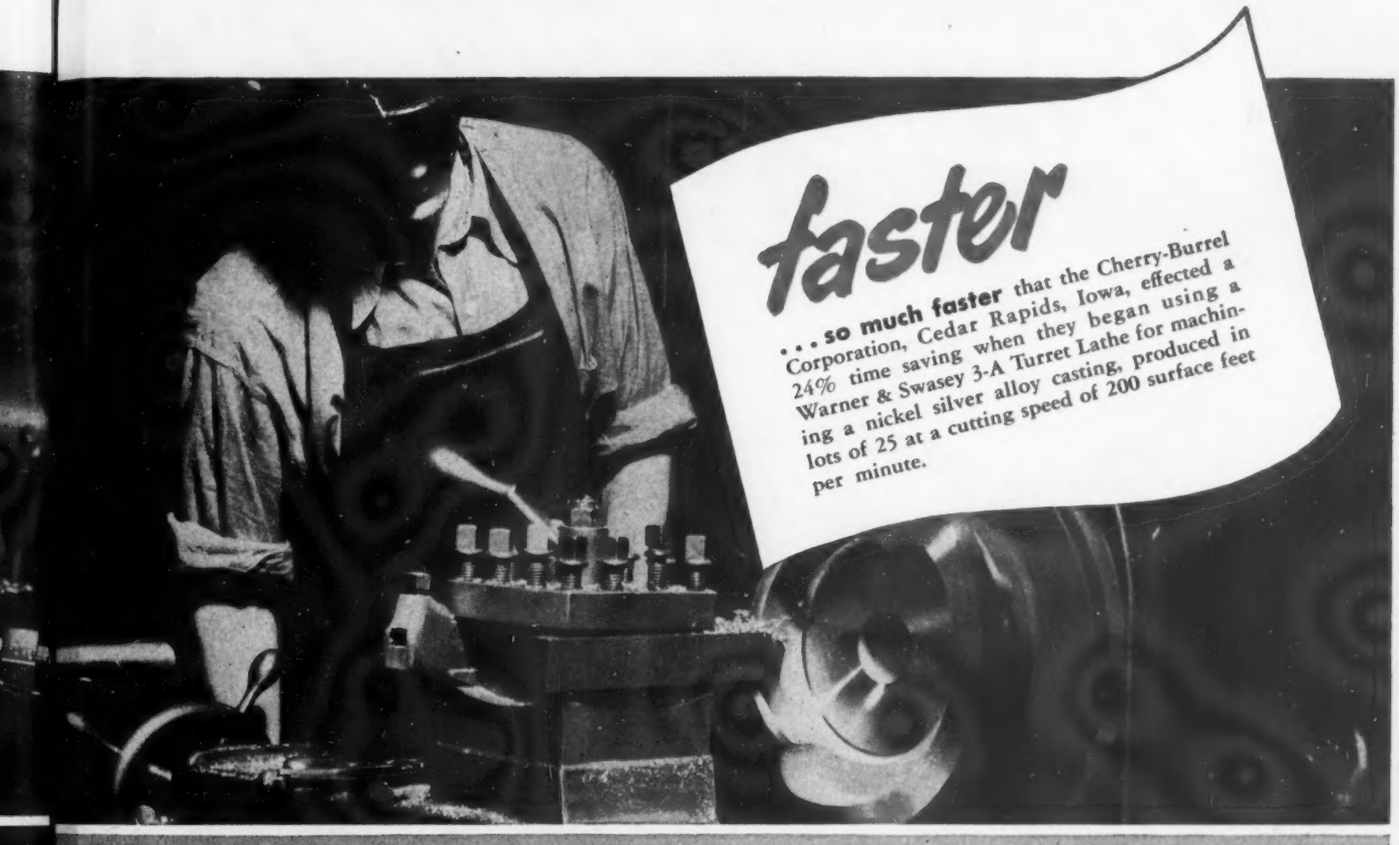
. . . so much better that in the plant of the Hanau Engineering Corporation, Buffalo, a Warner & Swasey Turret Lathe has made average production savings of 26.7%. Scrap loss is held to a minimum. Stainless steel, brass and aluminum parts for scientific instruments are held to close tolerances—turned out with mirror-like finishes.



for less . . .

. . . for so much less that in another shop on one turning job, a part cost was reduced from 64¢ to 10¢, on another from 6¢ to 2¢. In hundreds of plants Warner & Swasey surveys have led to replacement with new Warner & Swasey Turret Lathes, or the substitution of new tooling methods, or the improvement of new model turret lathes with installations of modern accessories to result in time savings that pay for the improvement in short order.

machine it...



faster

...so much faster that the Cherry-Burrel Corporation, Cedar Rapids, Iowa, effected a 24% time saving when they began using a Warner & Swasey 3-A Turret Lathe for machining a nickel silver alloy casting, produced in lots of 25 at a cutting speed of 200 surface feet per minute.

with a Warner & Swasey

Trained Warner & Swasey field engineers will be glad to survey your turret lathe operations, and to show you how you can machine it better, faster, for less with a Warner & Swasey.

WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

NON-FLUID OIL

TRADE MARK REGISTERED

ARRESTS FRICTION

NON-FLUID OIL arrests friction because it provides positive lubrication upon split-second demand as soon as your machinery starts up. It does not have to be aided or softened by frictional heat before starting to lubricate—as is the case with ordinary greases. In fact, NON-FLUID OIL keeps bearings noticeably cooler.

Furthermore, it outlasts grease several times, its greater durability being especially marked when it is used in warm weather or on machinery in hot locations. Under such conditions grease melts and wastes freely, but NON-FLUID OIL retains its consistency, not being affected by temperature changes.

NON-FLUID OIL, the modern lubricant, is produced from the very highest grade petroleum. A special process enables it to overcome the drawbacks of oil and grease. It is produced in grades exactly adapted to the lubrication of every type of machine. NON-FLUID OIL is applied in the same way as liquid oils and greases and does not require the purchase of any special lubricating appliances or any changes in lubricating technique.

CURRENT QUOTE

"Since using NON-FLUID OIL we have practically eliminated bearing failures which we had experienced in the past."

N. Y. & N. J. LUBRICANT CO., Dept. S.
292 Madison Avenue, New York 17, N. Y.
Please send testing sample of NON-FLUID OIL to be used in the following machinery: .....
.....
.....
Name.....
Company.....
Street.....
City..... State.....

WAREHOUSES: Charlotte, N. C.—Greenville, S. C.—Atlanta, Ga.—Providence, R. I.—Detroit, Mich.—Chicago, Ill.—St. Louis, Mo. WORKS: Newark, N. J.

NEW YORK & NEW JERSEY LUBRICANT CO.

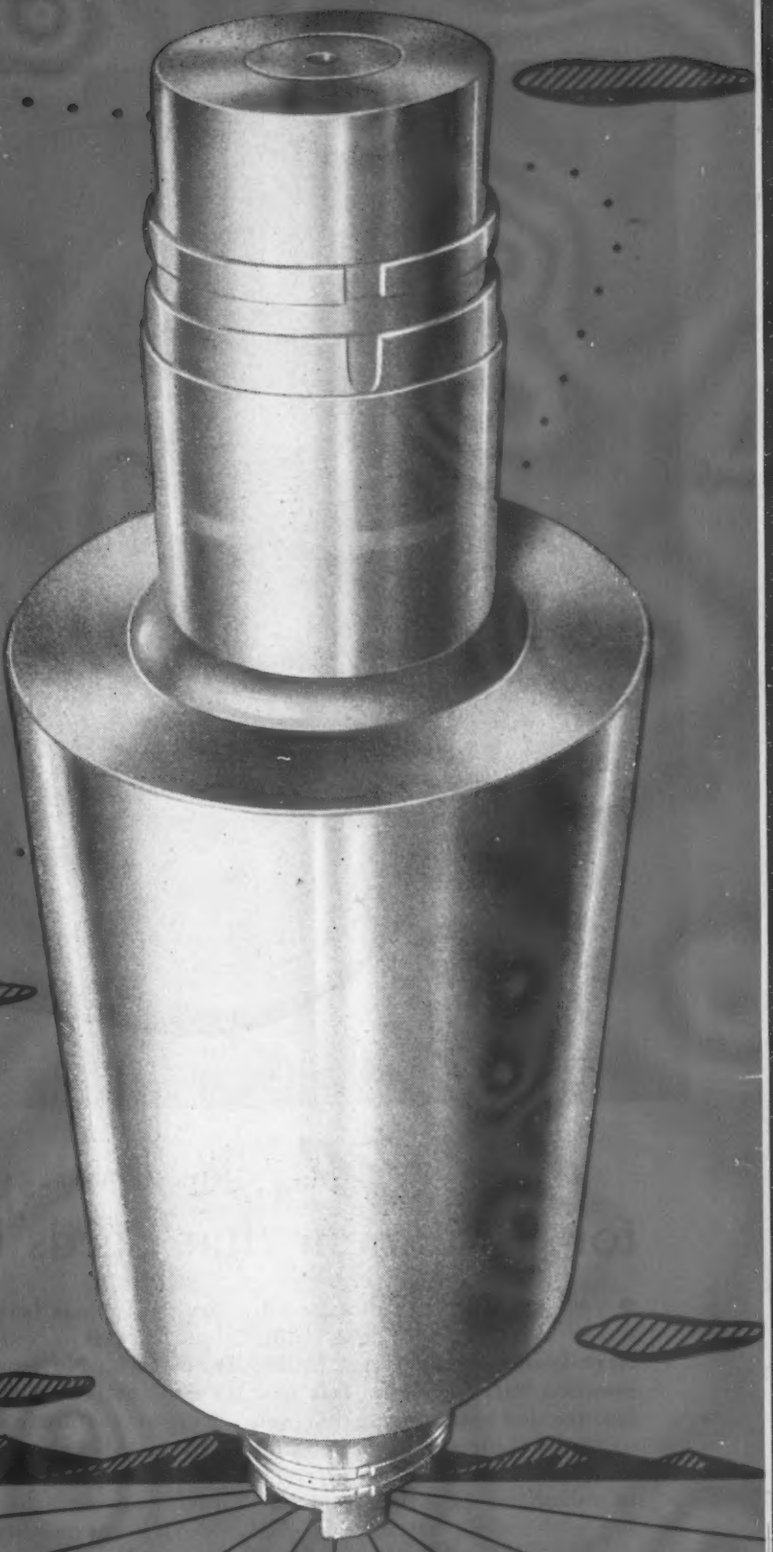
292 MADISON AVENUE, NEW YORK 17, N.Y.

Where

MIGHT

is

RIGHT



Strength, wear resistance, rigidity and surface perfection . . . those are the demands you must satisfy. Ohio Steel can supply the RIGHT ROLLS for every type of rolling job.

Ohio Rolls

SHAPING METAL FOR ALL INDUSTRY

Select from any of these eleven types of Ohio Steel and Iron Rolls: Carbon Steel Rolls, Ohioloy Rolls, Ohioloy "K" Rolls, HOLL-O-CAST Rolls, Chilled Iron Rolls, Alloy Chilled Iron Rolls, Denso Iron Rolls, Nickel Grain Rolls, Special Iron Rolls, Nioloy Rolls, Flintuff Rolls.

THE OHIO STEEL FOUNDRY COMPANY ★ LIMA, OHIO

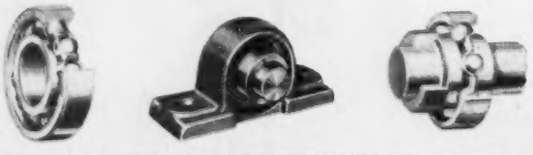
Plants at Springfield and Lima, Ohio

Now... a slow-speed ball bearing for equipment that needs ball bearing smoothness

● YOU'RE LOOKING at a totally different ball bearing... the Fafnir High-Load Ball Bearing. Unlike standard ball bearings, this new anti-friction bearing is not designed to handle the terrific speeds of spinning shafts. Instead, its purpose is to smooth out the action of oscillating and rolling assemblies. It's made to take more pounds of weight, size for size, than the usual ball bearing. Not only weight but abuse, dirt and moisture.

It's lighter than other bearings but you don't see the real difference till you take off the patented Plya-Seals. The space between inner and outer races is packed with hardened steel balls. No separators. That's the full ball complement for greater weight sustaining and smooth action. All exposed surfaces are cadmium plated or of corrosion resisting material. The PLYA-SEAL keeps in lubricant, locks out dirt and moisture. Made to inch instead of metric dimensions. Bores fit standard bolt sizes.

The Fafnir High-Load offers alert manufacturers ball bearing smoothness where ball bearings were never used before... because it can be smaller, requires no maintenance and is so easily installed and removed. Now adding new smoothness and accuracy to such equipment as business machines, photographic apparatus, printing presses, paper making machinery, dental and medical equipment and farm machinery. Possibly there's an oscillating or rolling assembly in your new design that you could make a winning feature by giving it Fafnir Ball Bearing smoothness. Send blue prints or write for full information. The Fafnir Bearing Company, New Britain, Conn.

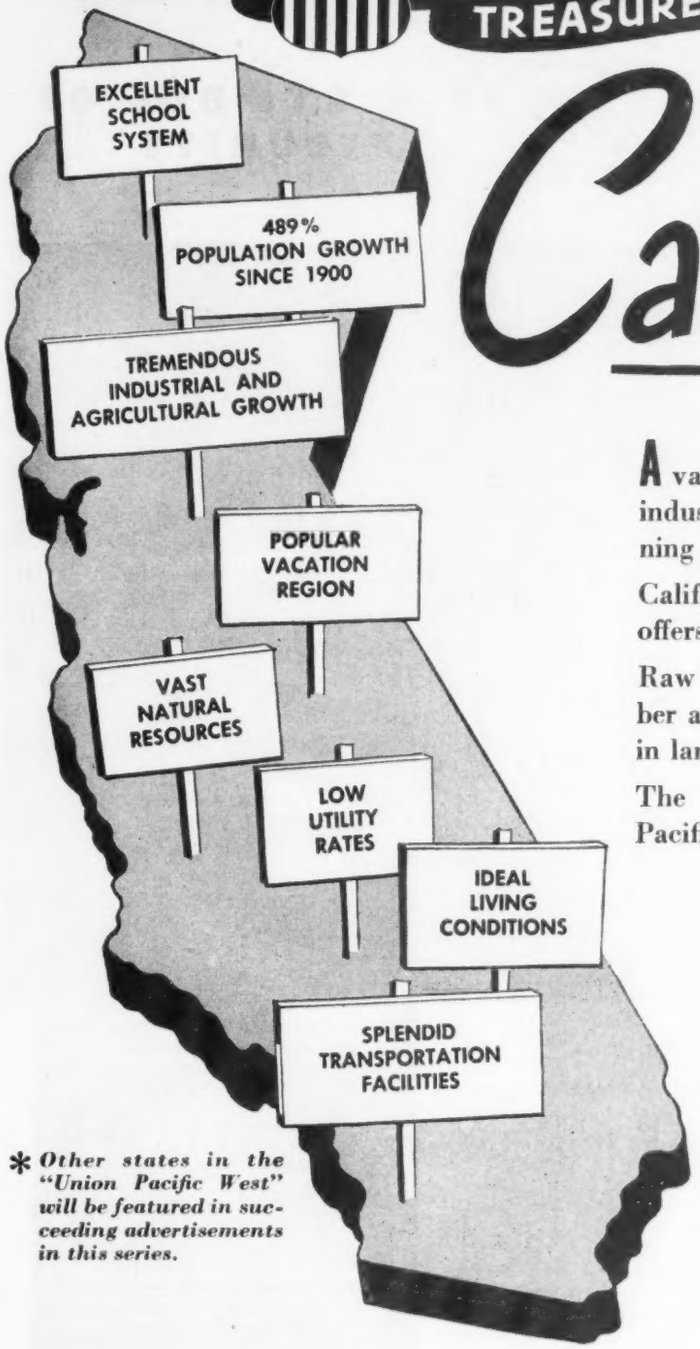


FAFNIR BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

UNION PACIFIC

TREASURE MAP OF INDUSTRY

California *



A vast opportunity for development awaits industrial and commercial concerns planning a west coast location.

California's population, steadily increasing, offers a tremendous easy-to-reach market.

Raw materials . . . minerals, petroleum, lumber and agricultural products are available in large quantities.

The Golden State is ideally located for Pacific export trade.

Hydro-electric power, nearby natural gas and oil fields, a mild all-year climate are industrial advantages.

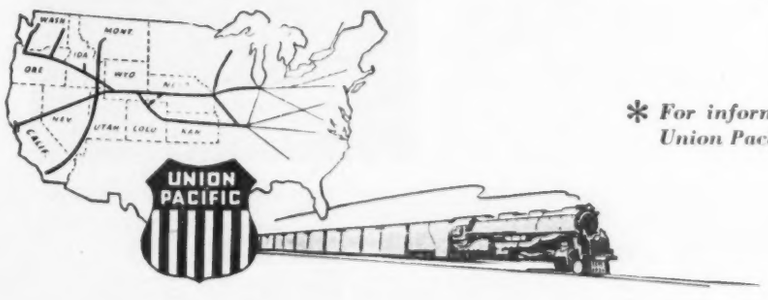
Freight transportation facilities are unsurpassed. California is one of eleven western states served by the Union Pacific Railroad.

For industrial expansion, consider California. For dependable, all-weather transportation, to or from the West, we suggest—

be Specific – say "Union Pacific"

* *Other states in the "Union Pacific West" will be featured in succeeding advertisements in this series.*

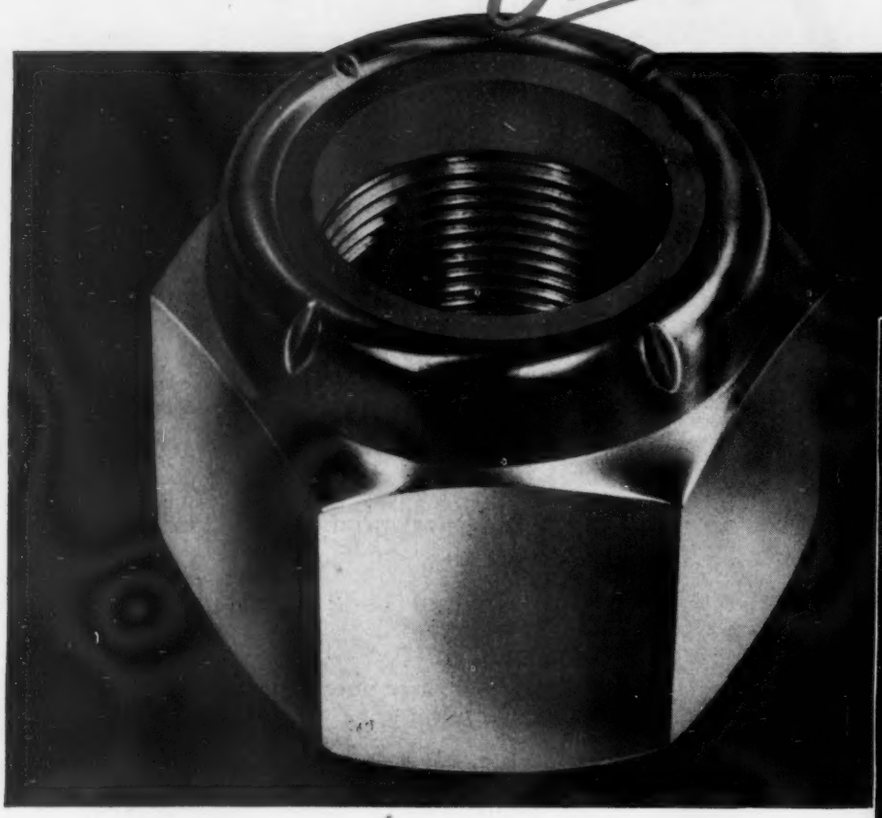
* *For information address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska.*



UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

THE FAMOUS *Red Elastic Collar* IS A SYMBOL OF SECURITY

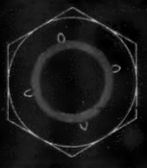


It makes ESNA *Elastic Stop Nuts Self-Locking, Self-Sealing and Reusable*

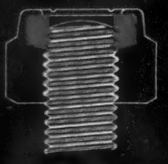
As a result, all ESNA Elastic Stop Nuts protect assemblies against the effects of: VIBRATION: Elastic Stop Nuts lock in position anywhere on a bolt or stud. Vibration, impact or stress reversal cannot disturb prestressed or positioned settings. . . . CORROSION: Elastic Stop Nuts keep the working threads on the bolt and nut bright and rust-free to protect their strength and permit easy removal without damage to the bolt. . . . THREAD FAILURE: Elastic Stop Nuts dampen impact stresses and materially reduce the shocks against bolt threads that frequently cause metal fatigue. . . . LIQUID SEEPAGE: Elastic Stop Nuts produce a radial-reactive pressure against the bolt threads inside the Red Elastic Collar that makes Elastic Stop Nuts self-sealing against liquid seepage. . . . COSTLY MAINTENANCE: Elastic Stop Nuts are reusable. (Torque tests on aircraft bolts prove that adequate locking torque is maintained through 15 on-and-off cycles.) They do not deform the bolt, damage the threads, gall the finish, or rust.

This wide range of protection permits full purchasing and inventory standardization and its resultant economy. For further information address: Elastic Stop Nut Corporation of America, Union, New Jersey. Sales Engineers and Distributors are conveniently located in many principal cities.

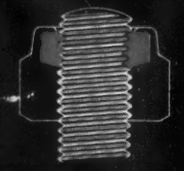
The RED ELASTIC COLLAR is . . .



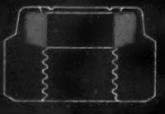
PERMANENTLY CLINCHED to prevent turning under application and subsequent operational stresses.



PERMANENTLY SECURE against vibration effects. The bolt impresses (does not cut) full contact threads.



PERMANENTLY TIGHT against moisture. Bolt threads have 100% contact in collar — and a full metal seat.



REUSABLE. The Red Elastic Collar retains its grip after repeated usage.

ESNA ELASTIC STOP NUTS

TRADE MARK

PRODUCTS OF: ELASTIC STOP NUT CORPORATION OF AMERICA

THE A. B. C.s OF MAKING MONEY WITH WHITCOMB LOCOMOTIVES

Over a period of more than forty years many reports have been received from users of Whitcomb locomotives. This interesting material includes accurate cost figures on operating and maintenance, performance data, hours worked, repair and replacement expense and in general, cost accounting figures pertaining to the operation of locomotives. Comparative figures on operating and maintenance expense between Whitcomb locomotives and the locomotives they replaced were also available. It was found in most instances, savings were made possible because one or more of the following situations existed:

A—Whitcomb locomotives were performing the *same work* in *less time* at *less cost.*

B—Whitcomb locomotives were performing *more work* in the *same time* at *less cost.*

C—Whitcomb locomotives were available *more of the time* at *less cost* for operating and maintenance.

All of which goes to prove that Whitcomb locomotives can and have made important money for their users—they will operate just as profitably for you.

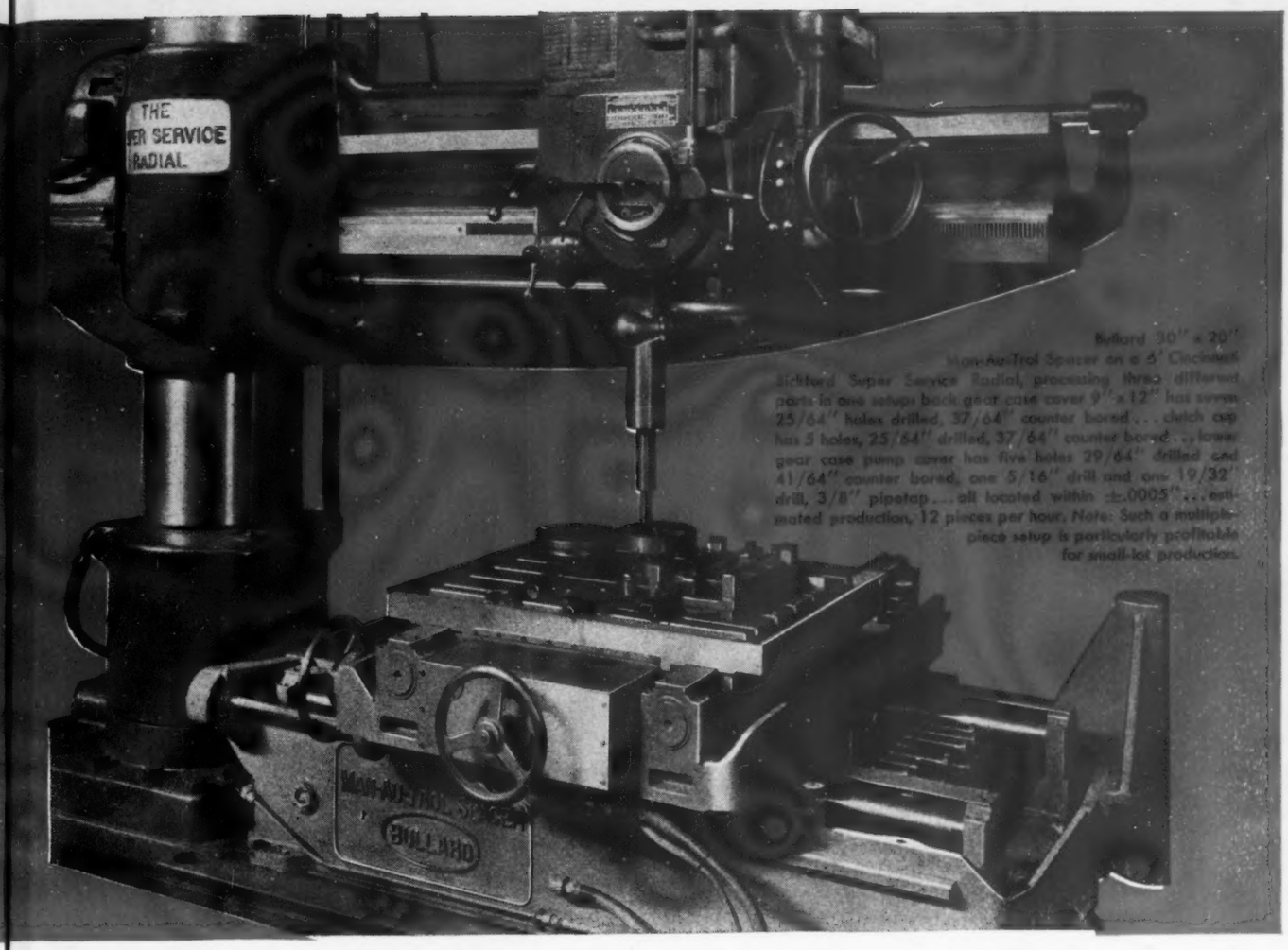
BLW THE BALDWIN GROUP

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILL.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

Bullard 4" x 4" Man-Au-Trol Spacer on a 24" Cincinnati Bickford Super Service Box Column Upright, processing motor coupling: four 5/8" holes, drilled, bored and reamed, 1" deep . . . accuracy ±.0005" instead of former method's ±.001" . . . production increased approximately 50%.



Bullard 30" x 20" Man-Au-Trol Spacer on a 5' Cincinnati Bickford Super Service Radial, processing three different parts in one setup: back gear case cover 9" x 12" has seven 25/64" holes drilled, 37/64" counter bored . . . clutch cap has 5 holes, 25/64" drilled, 37/64" counter bored . . . lower gear case pump cover has five holes 29/64" drilled and 41/64" counter bored, one 5/16" drill and one 19/32" drill, 3/8" pipetap . . . all located within ±.0005" . . . estimated production, 12 pieces per hour. Note: Such a multiple-piece setup is particularly profitable for small-lot production.

New Bullard Man-Au-Trol Spacers Eliminate Hole-Locating Jigs and Fixtures

Bullard MAN-AU-TROL Spacers now on the production line are more than living up to their advance notices. Machines and men formerly tied up on the non-productive work of making hole-locating jigs are now doing the kind of productive work that cuts operating overhead, develops competitive price advantages and steps up profit. Drilling, boring, reaming and tapping volume and accuracy are reaching new peaks . . . while operators' fatigue is measurably reduced.

To bring yourself up to date on this revolutionary new hole-locating method, write for the MAN-AU-TROL Spacer Bulletin. The Bullard Company, Bridgeport 2, Connecticut.

BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

Get Rid of Dirt and Grease The Jenny Steam-Spray Way

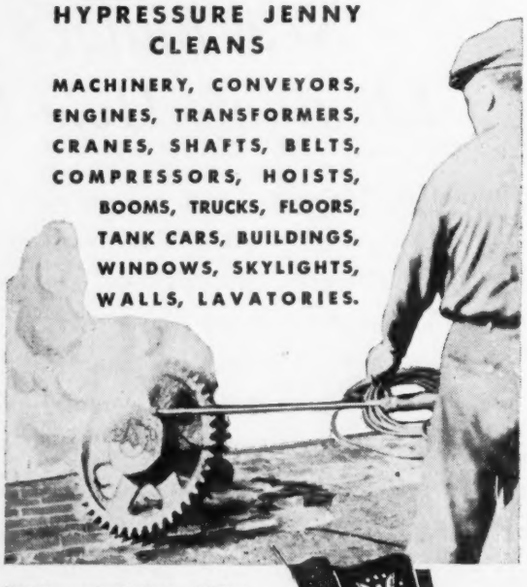
8 to 10 Times Faster Than By Hand Methods

Actual time studies reveal that when mechanics are forced to fight dirt and grease on machinery, tools and equipment, their production speed is slowed as much as 25% to 40%. Periodic JENNY Steam-Spray cleaning not only saves these precious man-hours, but often prevents costly shutdowns by revealing cracks and defects in vital production machinery in time to permit repairs before serious failures occur. JENNY keeps floors and runways clean for safer, faster plant traffic . . . provides better light by cleaning windows, walls and skylights . . . lessens fire hazards. And JENNY does it 8 to 10 times faster than by outmoded hand-cleaning methods.

Hundreds of manufacturing plants, mills and factories have adopted JENNY as the quickest, most economical and most efficient method for all their cleaning jobs. Let us show you how to increase *your* plant production by getting rid of speed-retarding dirt and grease the JENNY Steam-Spray Way. Write today.

HYPRESSURE JENNY CLEANS

MACHINERY, CONVEYORS, ENGINES, TRANSFORMERS, CRANES, SHAFTS, BELTS, COMPRESSORS, HOISTS, BOOMS, TRUCKS, FLOORS, TANK CARS, BUILDINGS, WINDOWS, SKYLIGHTS, WALLS, LAVATORIES.



"M" Pennant with three additional gold stars—Maritime's highest production award to our men and women making valves for the Victory Fleet.

HYPRESSURE JENNY DIVISION OF

HOMESTEAD VALVE MFG. CO.

P. O. BOX 22 . . . . . CORAOPOLIS, PENNSYLVANIA

P.R.W

ROLLING TECHNIQUE . . .

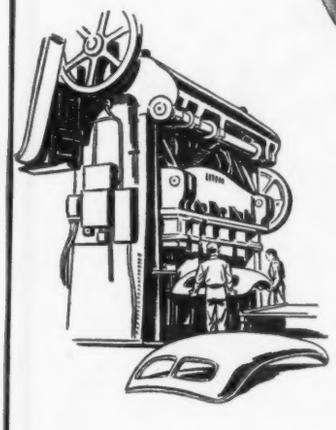
P.R.W

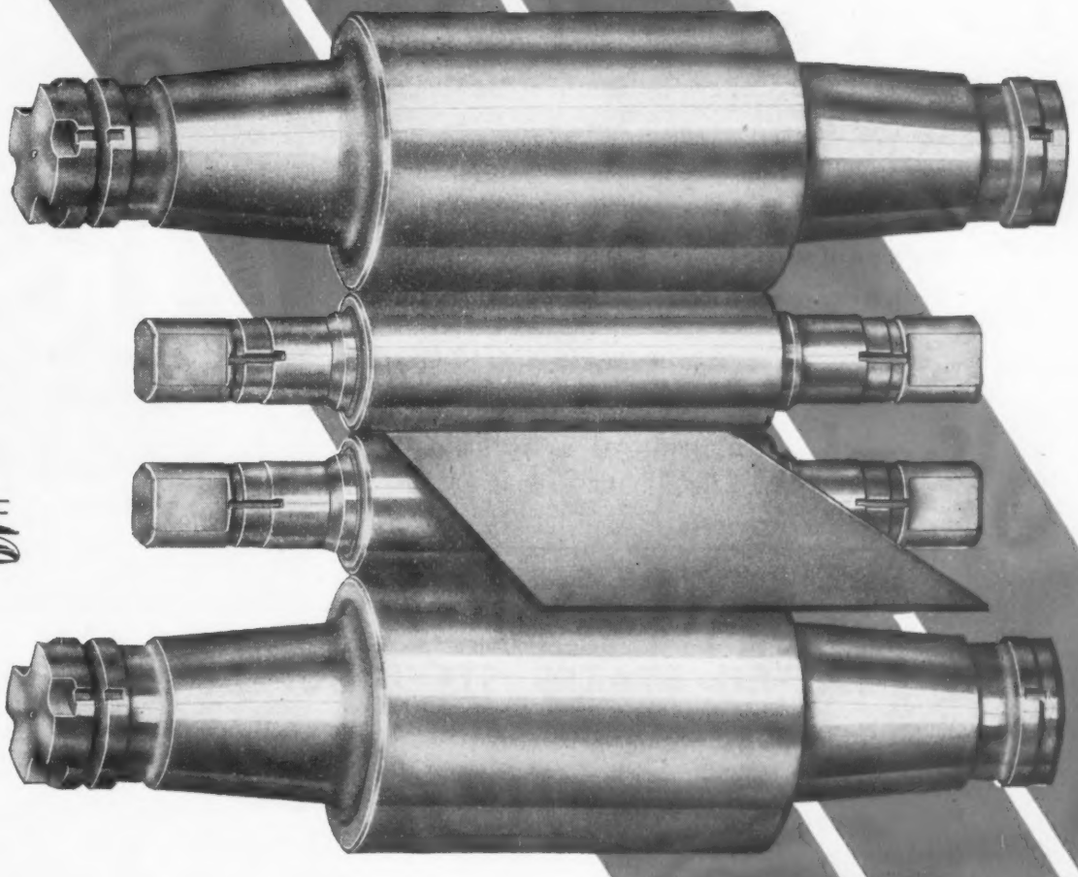
Strip Mills

Today's production lines turning out new automobiles, new airplanes, new appliances, and many other items demanded by the consuming public, require thousands of tons of coiled strip for stamping and forming.

Pittsburgh Rolls alloy iron *work rolls* and alloy steel *back up rolls* in four-high strip mills are rolling aluminum, brass, copper and magnesium, as well as steel, and are successfully producing flat rolled products *at less cost per ton rolled.*

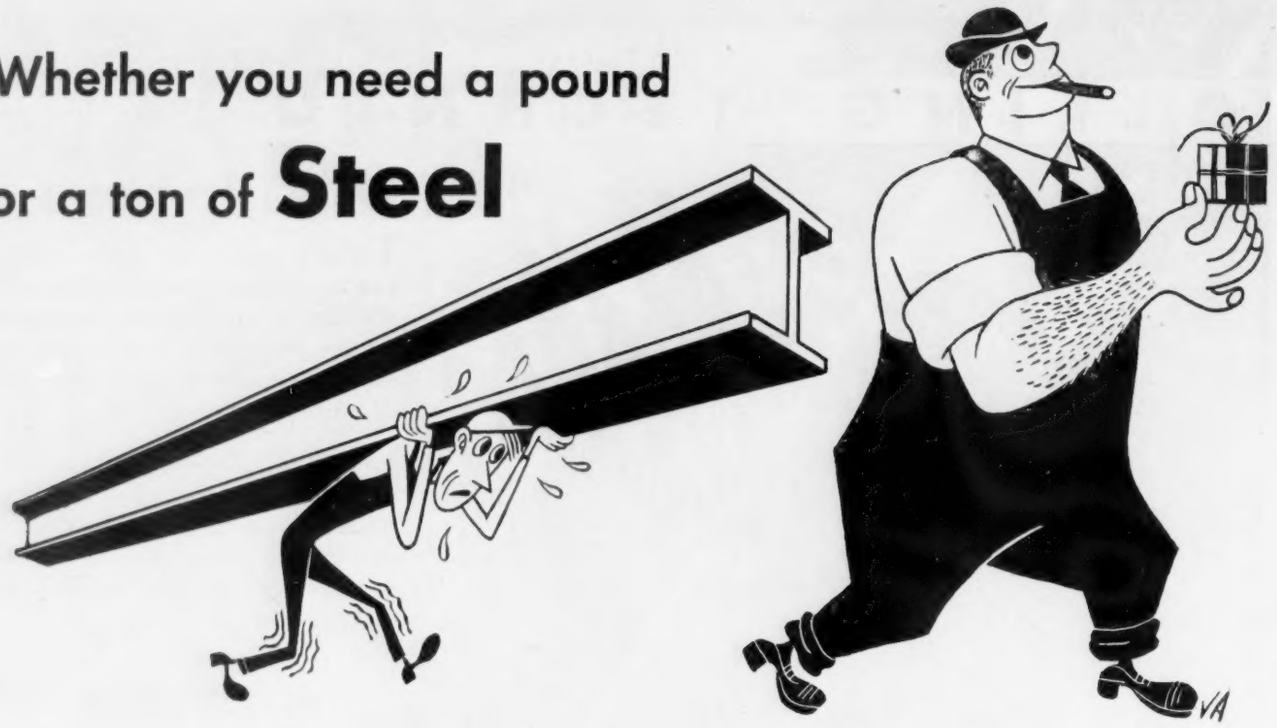
PITTSBURGH ROLLS
DIVISION OF BLAW-KNOX COMPANY
Pittsburgh, Pa.





PITTSBURGH ROLLS

Whether you need a pound or a ton of **Steel**



. . . call us for prompt, courteous service

No matter what your steel requirements may be . . . Stainless, High Strength, or Alloy Steels . . . Hot Rolled or Cold Finished Bars, Structural Shapes, Plates, Sheets, Machinery, etc.,—our facilities are at your disposal to give you the kind of service you have the right to expect. Call, write or wire our warehouse nearest you.

UNITED STATES STEEL SUPPLY COMPANY
USS
STEELS
SERVICE

Symbol of Service

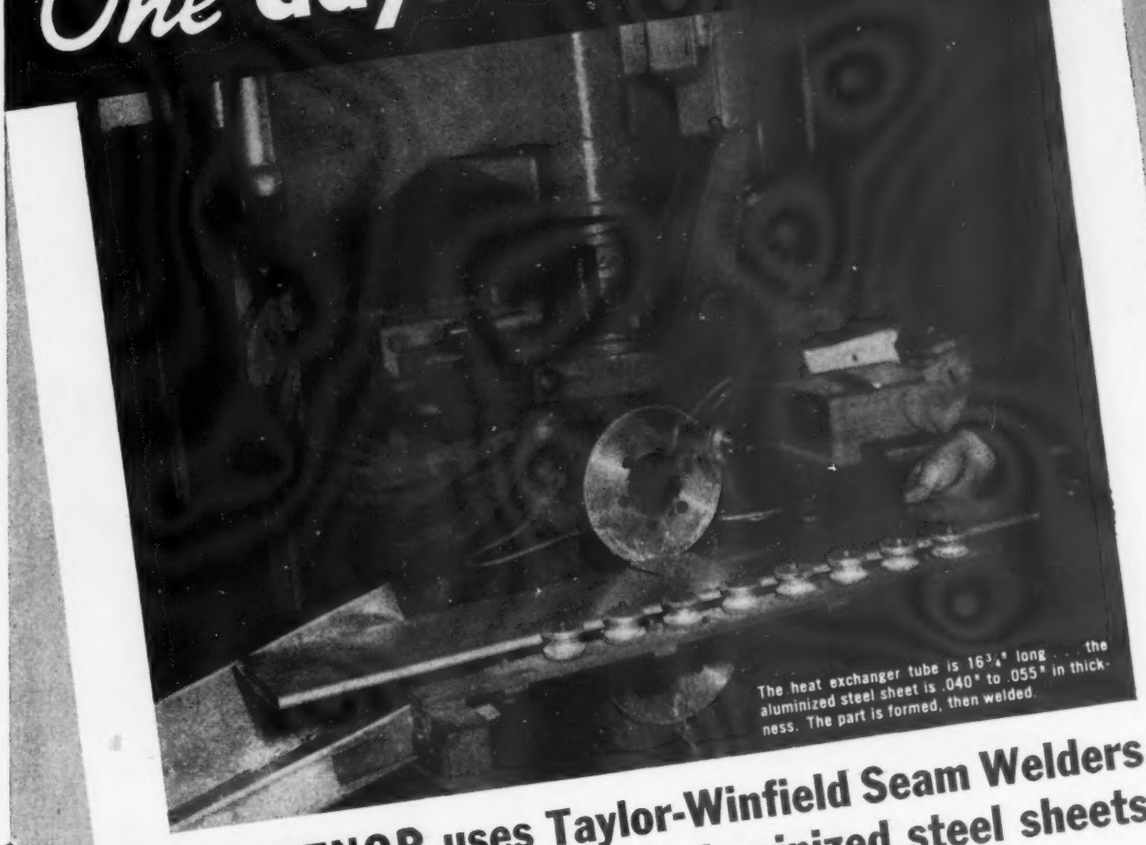
FOR STEEL USERS

UNITED STATES STEEL SUPPLY COMPANY

CHICAGO (90)	1319 Wabansia Ave., P. O. Box MM	BRUnswick 2000
BALTIMORE (3)	Bush & Wicomico Sts., P. O. Box 2036	Gilmor 3100
BOSTON	176 Lincoln St., (Allston 34), P. O. Box 42	STAdium 9400
CLEVELAND (14)	1394 East 39th St.	HEnderson 5750
MILWAUKEE (1)	4027 West Scott St., P. O. Box 2045	Mitchell 7500
NEWARK (1), N. J.	Foot of Bessemer St., P. O. Box 479	Bigelow 3-5920 REctor 2-6560, BErgen 3-1614
PITTSBURGH (12)	1281 Reedsdale Street, N. S.	CEdar 7780
ST. LOUIS (3)	21st & Gratiot St., P. O. Box 27	MAin 5235
TWIN CITY	2545 University Ave., St. Paul (4), Minn.	NEstor 7311

UNITED STATES STEEL

One day's work in *One* hour

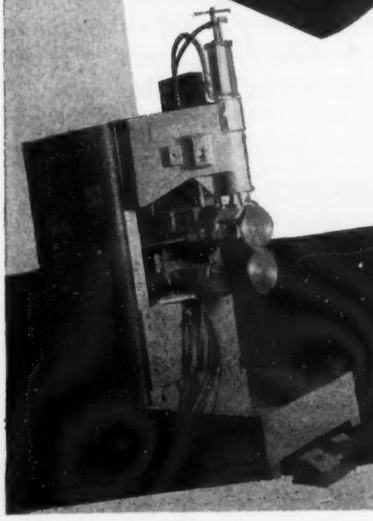


The heat exchanger tube is 16 3/4" long . . . the aluminized steel sheet is .040" to .055" in thickness. The part is formed, then welded.

REZNOR uses Taylor-Winfield Seam Welders to join aluminized steel sheets

PROBLEM—to weld more tubes per day. OLD METHOD—acetylene welding. MATERIAL—aluminized sheets. OLD RATE—60 tubes per hour. NEW METHOD—Resistance welding with Taylor-Winfield seam welder. NEW RATE —520 tubes per *hour*.

Whenever your production concerns the joining of metals . . . consult Taylor-Winfield. With spot, seam, projection, and butt welding equipment, Taylor-Winfield has increased production on thousands of parts during the past 48 years. *Write for New, Practical Catalog.*



The TAYLOR-WINFIELD CORPORATION

WARREN • OHIO

TAYLOR-WINFIELD RESISTANCE WELDERS

"ROUGHING IT" THE EASY WAY

Another problem solved by BWH!

Applying a new facing to a big western dam posed a problem for the contractor. The old face had to be "roughed" with compressed air into an irregular pattern to hold the new concrete. That meant finding an air hose that could "take" high pressures, heat and oil from the compressors, shocks from sharp falling rocks and contact with rocky surfaces. To handle this job, BWH recommended tough Bay State Air Drill Hose.

The tube of this rugged hose is made with the highest-quality, extra-heavy rubber . . . able to withstand the deteriorating action of hot oils. Several plies of strong duck, bonded together with long-life friction, form the carcass. Since the contractor selected 2½" hose, the duck had to be 40% heavier than for smaller sizes.

Tube and carcass were encased in a stout rubber cover . . . the strongest ever devised to resist surface damage. This powerfully built hose performed perfectly . . . helped the contractor finish the job without costly delays.

Bay State Air Drill Hose is just one of the many quality products manufactured by BWH. Whatever industrial rubber goods you need, look to BWH for dependable ruggedness . . . BWH distributors for dependable service.

HAVE YOU A JOB WHERE STAMINA COUNTS?

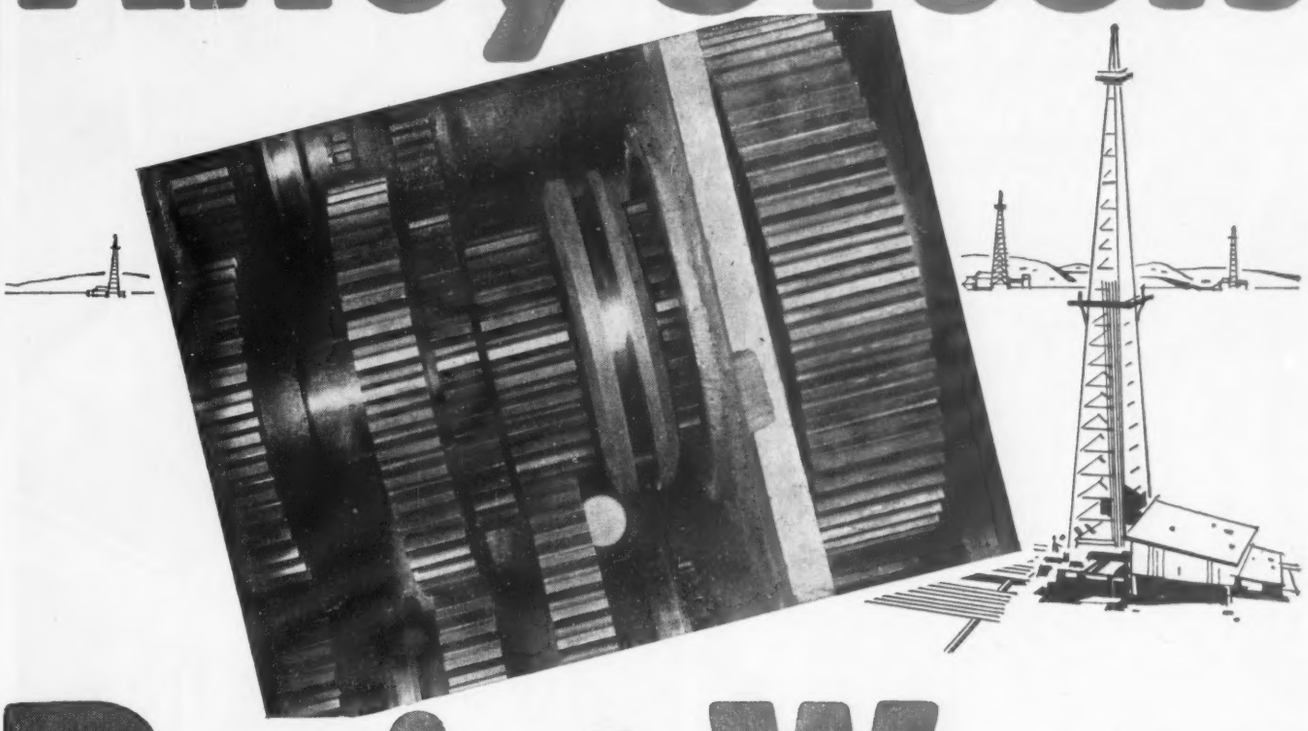
Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BWH distributor, or write direct.

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

Alloy Steels



Resist Wear

BETTER THAN ANY OTHER MATERIAL

For gears, like those shown above used in drawworks for oil well drilling, or for any application where parts must resist severe wear, you just cannot beat alloy steels.

These fine steels respond better and more uniformly to heat treatment than any other material. Thus, parts made from them have hard wear-resisting surfaces that last longer than other materials—without any sacrifice of the tough, strong core.

Alloy steels have other qualities, too, which make them the ideal material for vital machine parts—both from performance and cost viewpoints. They are exceptionally high in strength-to-weight ratio. They resist shock, impact and vibration. They resist fatigue. In stainless grades, they resist corrosion, oxidation and loss of strength at high temperatures. They take hard use and abuse better than any other material.

Republic—world's foremost producer of alloy steels — is ready to help you in selecting the most efficient analysis for each use—and in fabricating and processing it to develop desired results. Write us.

REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

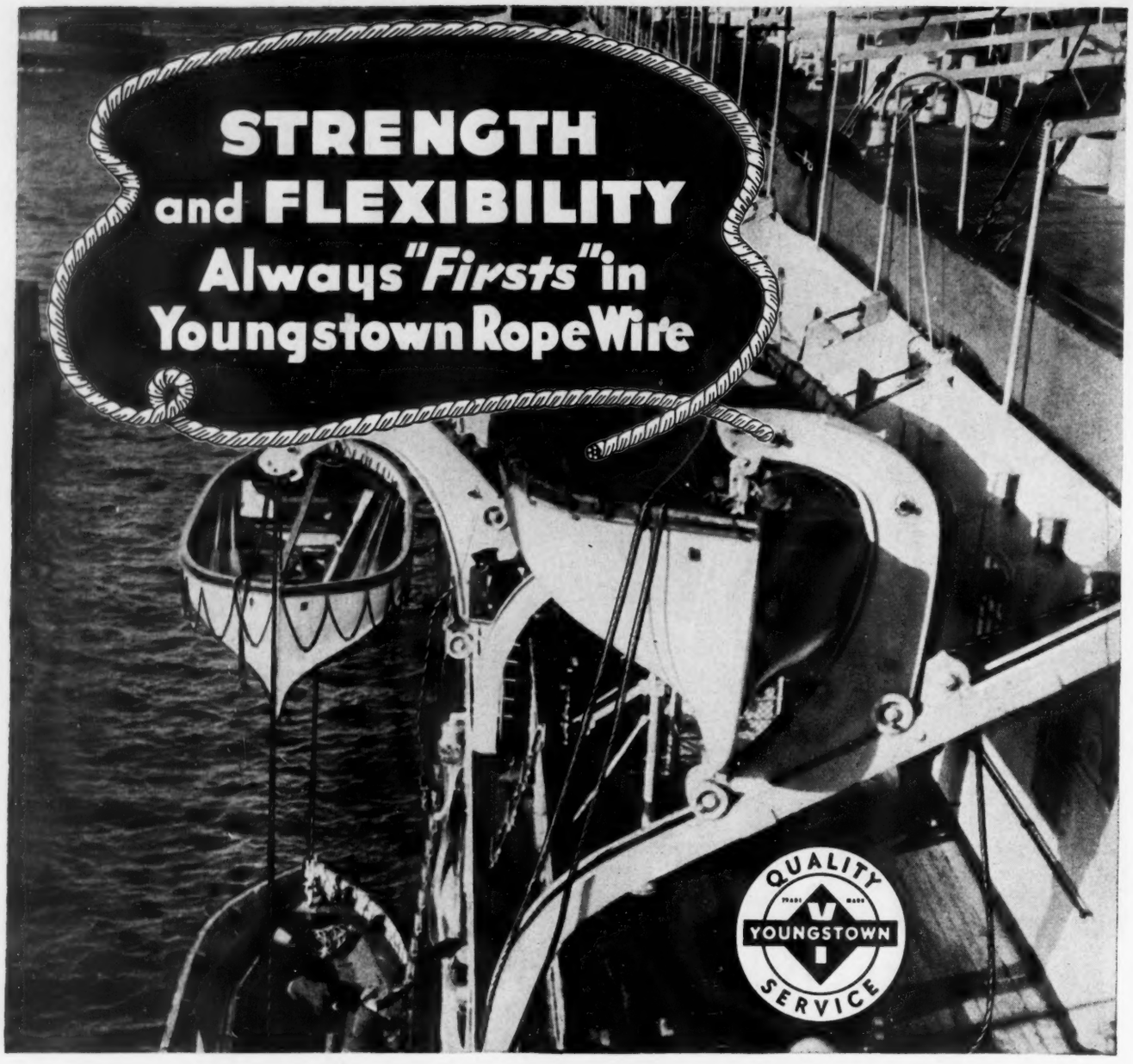
Export Department: Chrysler Building, New York 17, N. Y.

Republic

REPUBLIC STEEL

ALLOY STEELS

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing



As lifeboats are manned

LIVES depend on wire rope when a crisis comes at sea and lifeboats are lowered. Ropes must run fast over sheaves--smoothly, surely, with no possibility of a jam. Strength and flexibility are "firsts."

Wire rope can be no better than the wire from which it is woven. Quality in the wire must start in the steel. Rope woven from Yolectro High Carbon Rope Wire can be dependably strong and flexible, because strength and flexibility are built into it--guarded at every step of production, from the charging of the open hearth to the final inspections.

So specify Yolectro Rope Wire to measure up in strength and flexibility. It runs uniform in gauge, has toughness to resist abrasion, has properties to resist corrosion. Yolectro High Carbon Rope Wire, like all other Youngstown wire mill products, is of finest quality steel, refined, rolled and drawn to exacting specifications.

Photo—Courtesy Preformed Wire Rope Information Bureau.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

GENERAL OFFICES - YOUNGSTOWN 1, OHIO

Export Offices - 500 Fifth Avenue, New York City

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Bars-Rods-Wire-Cold Drawn Carbon Steel Rounds-Electrolytic Tin Plate-Coke Tin Plate-Pipe and Tubular Products-Sheets - Plates - Conduit - Tie Plates and Spikes.

The success of any safety program depends largely upon worker cooperation. And when employees place comfort on a par with protection you'll find the Willson FeatherSpec fills the bill on both counts.

Here is plastic eye protection, less than an ounce in weight, designed primarily for the many semi-hazardous jobs. Workers can wear the FeatherSpec all day long and hardly know they have it on. The integral, molded-in nosepiece rests lightly on the bridge of the nose while there's plenty of room for wearing prescription glasses.

FeatherSpec lenses are easily replaceable —but in use, are held secure in a sturdy metal suspension-lock frame. The lenses, either crystal clear or Willson Tru-Hue green are free from distortion.

Behind FeatherSpecs there's safety from flying sparks and chips in semi-hazardous jobs such as light grinding, wood working, spot welding.

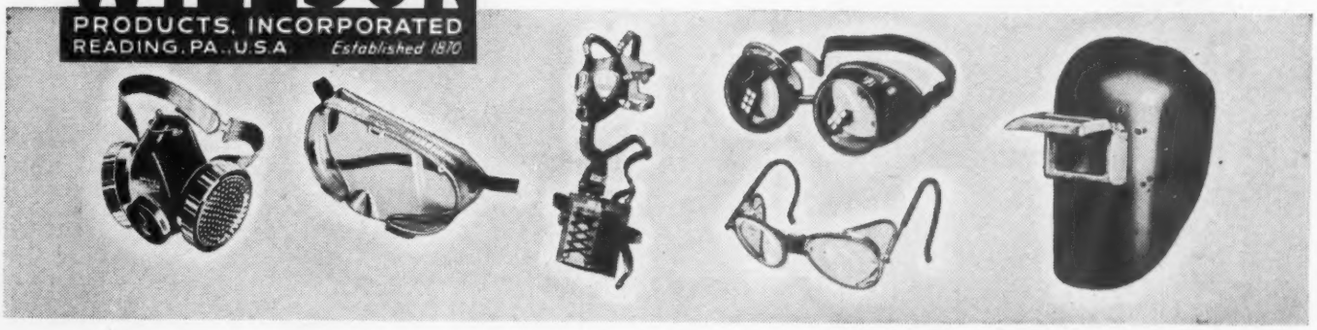
Large wide one-piece plastic lenses provide high frontal impact strength.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON PRODUCTS, INCORPORATED
READING, PA., U.S.A. *Established 1870*

For help with your eye and respiratory protection problems, consult your Willson distributor or write to Willson Products, Inc., 233 Washington Street, Reading, Pa.

WILLSON 1870 TRADE MARK



Yours for the asking . . . . .

WE have prepared a portfolio of reproductions showing our varied and unusual installations.

Each page is a story in itself with complete description of the installation illustrated.

If you are in the market for special equipment, send us full specifications and our Engineering Department will give your request prompt and expert attention, and give you advice and estimates that will be of great value in any contemplated work. We have the expert personnel and the capacity to give your requirements immediate attention.

This unusual portfolio is 8½" x 11" to fit your file—and is earmarked for ready reference.

Please write on your business stationery and this portfolio, together with any other data you may require, will be mailed to you at once. It is well worth while and it will prove a valuable addition to your data files.

DETROIT SHEET METAL WORKS
1296 Oakman Blvd. • Detroit 6, Michigan

PLANT ENGINEERING: *Consulting assistance in plant layout to coordinate departmental operations, our experience dated from 1917 in this field.*

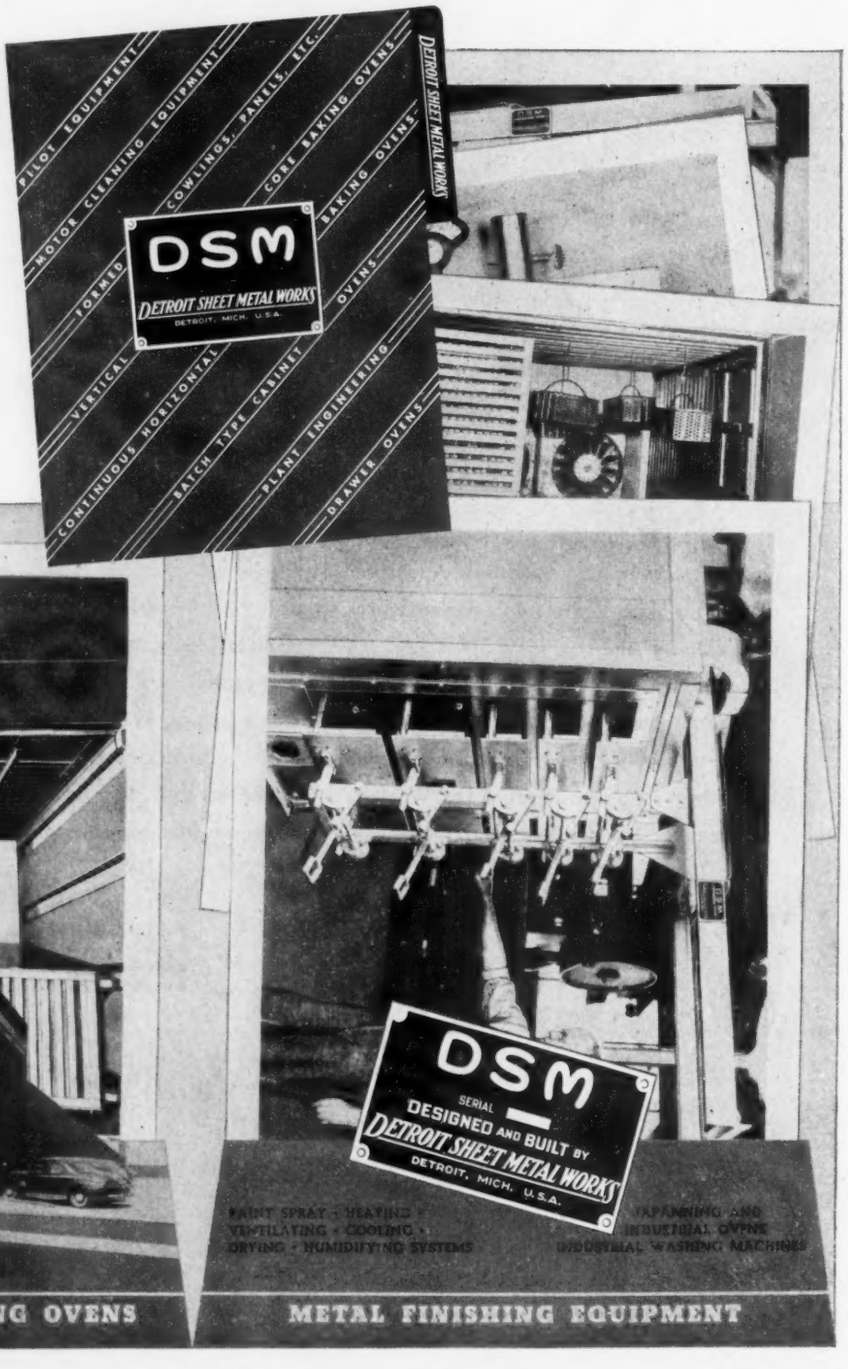
Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning tear-downs. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

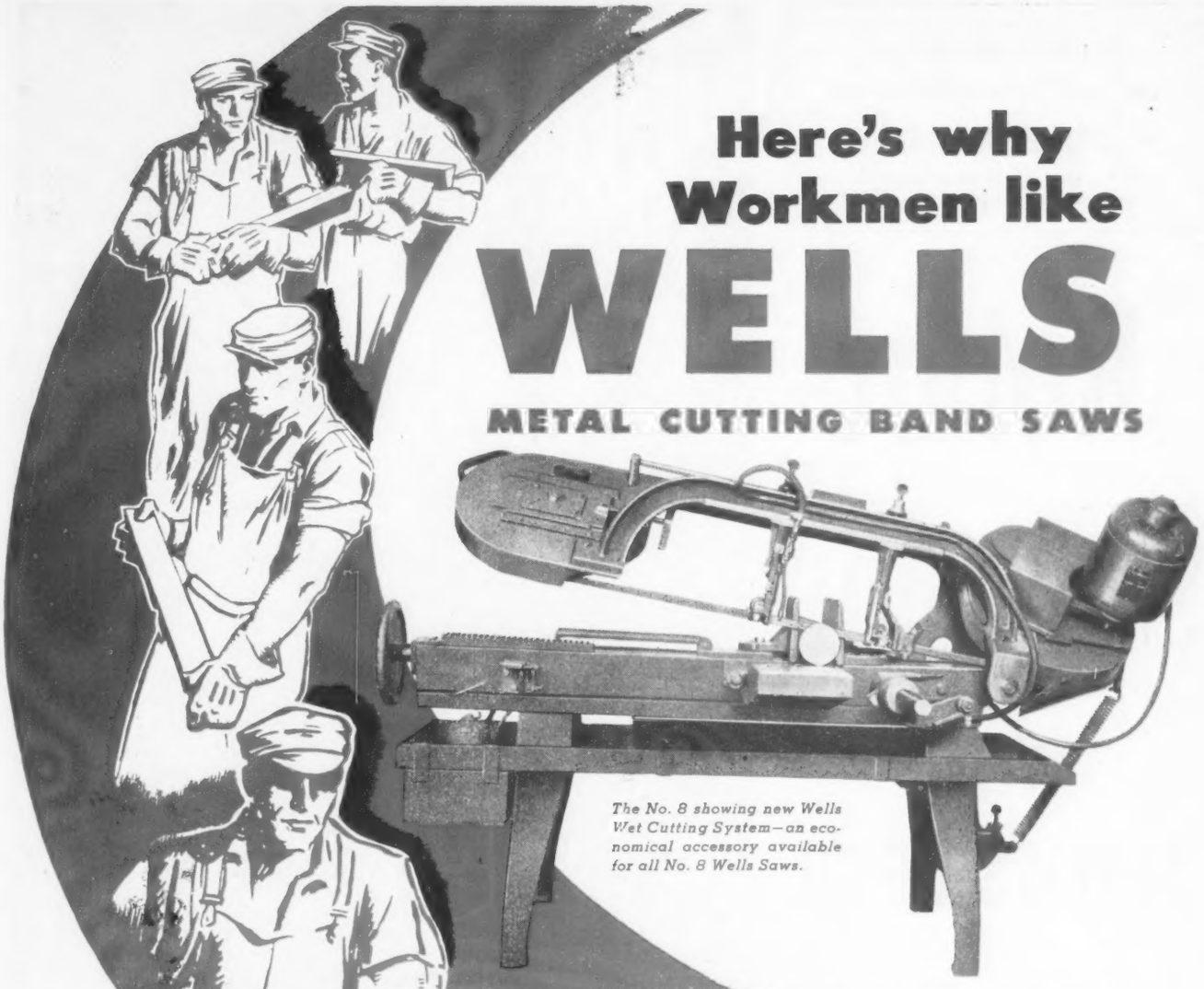
PILOT EQUIPMENT: *Sample size equipment for development of heavy equipment.*

VERTICAL CORE BAKING OVENS
CONTINUOUS HORIZONTAL BAKING OVENS • BATCH TYPE CABINET OVENS
DRAWER OVENS



Here's why Workmen like WELLS

METAL CUTTING BAND SAWS



The No. 8 showing new Wells Wet Cutting System—an economical accessory available for all No. 8 Wells Saws.

Specifications

CAPACITY:
Rectangular . . . . 8" x 16"
(Special Guides) . . . . 5" x 24"
ROUNDS: . . . . . 8" diameter
MOTOR: . . . ½ H.P., A.C. or D.C.
SPEEDS:
Selective 60, 90, 130 feet per minute
WEIGHT: . . Approximately 665 lbs.

You don't have to go through a lot of motions when you use a Wells Saw. Just place the material in position for cutting, give a turn to the hand wheel of the quick-acting vise, and you're ready to go. Hydraulic stabilizer on gravity feed and automatic shut-off take care of the rest. *No wonder the Wells is popular with users!*

From a management standpoint, it pays to provide workmen with these modern, efficient, versatile tools. Use them in stock rooms, machine shops, on maintenance jobs. Wells Saws do good work, cut close, remove minimum material. For production work, your Wells Saw can be equipped with the new Wells Wet Cutting System. Ask for complete information. See your local Wells representative or write.

Wells SAWS
THE SIGN OF SERVICE

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

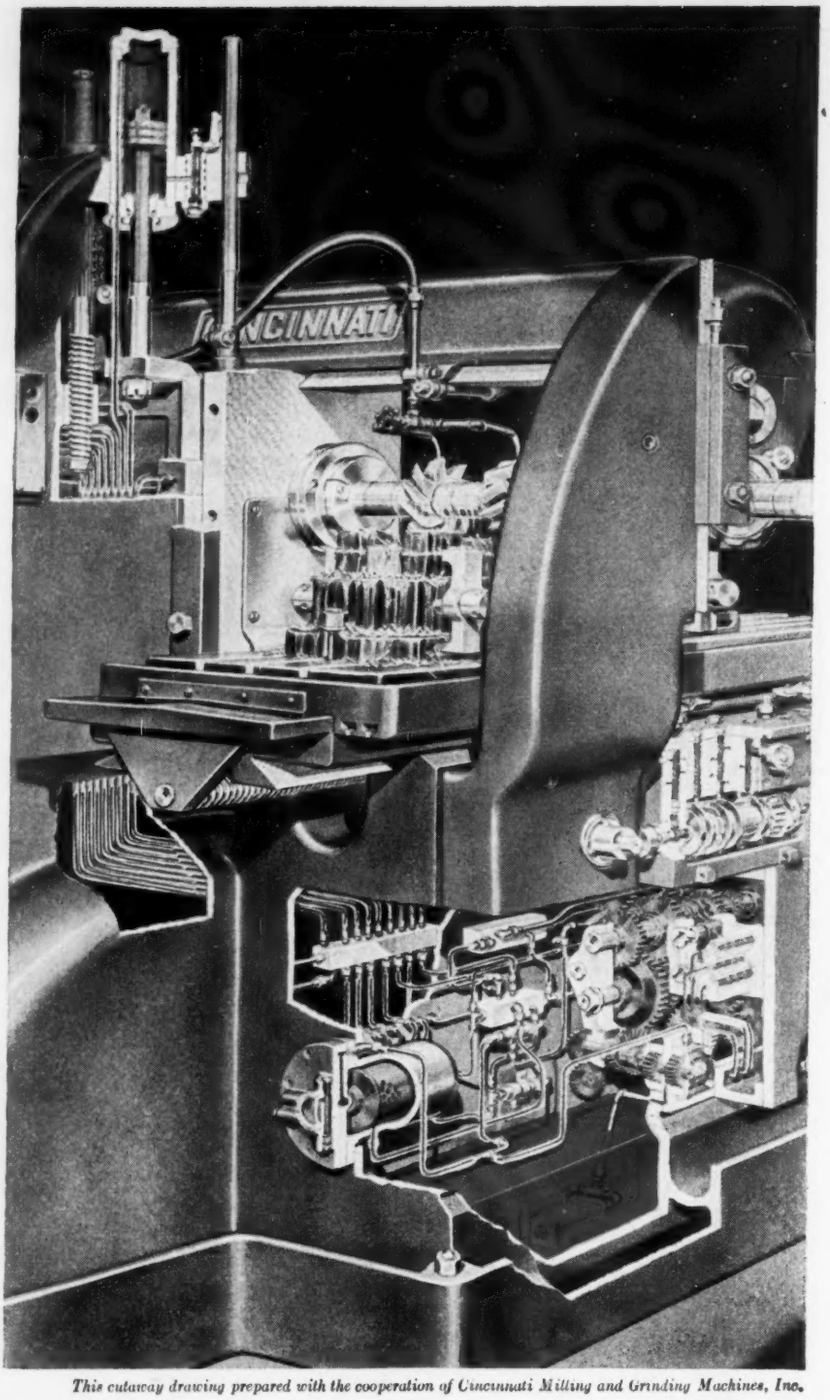
WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

Inside Knowledge on Lubrication Problems

– OIL STABILITY –

This is One of a Series of Messages on Common Problems in Your Plant

Robot Surgeon WITH "SINEWS" OF OIL



This cutaway drawing prepared with the cooperation of Cincinnati Milling and Grinding Machines, Inc.

COMPLETELY AUTOMATIC, this modern milling machine performs as many as 24 different functions.

It's all done with hydraulic controls. "Sinews" of oil transmit the power that governs the movements of the machine. This same oil also lubricates tableways, bearings and gears.

To assure continued accuracy of operation, this oil must possess exceptional stability to resist change over long periods. Appreciable change or the smallest deposits can affect the flow through small lines and interfere with smooth valve action.

Gargoyle D.T.E. Oil provides the superior stability so necessary for this job. Recommended by leading manufacturers of hydraulically controlled automatic machines, this outstanding oil stays clean to assure sensitive response to controls. Get details about this famous Socony-Vacuum product.

SOCONY-VACUUM OIL CO., INC.
and Affiliates: Magnolia Petroleum Company
General Petroleum Corporation

GARGOYLE Lubricants

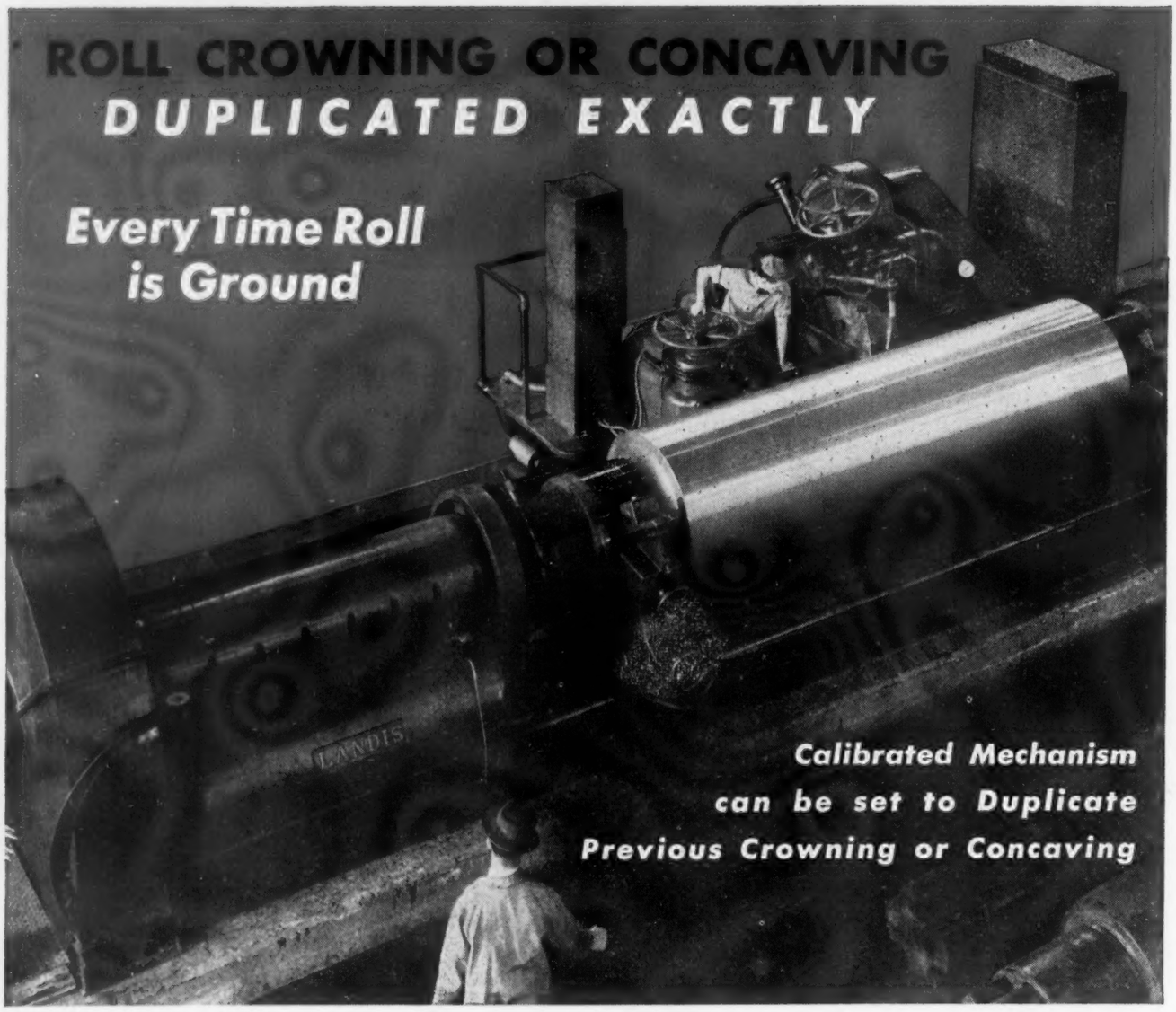
SOCONY-VACUUM

TUNE IN THE MOBILGAS PROGRAM — MONDAY EVENINGS, 9:30 E.S.T. — NBC

Socony-Vacuum Correct Lubrication

FOR EVERY MACHINE . . . EVERY OPERATING CONDITION

LADISH CO., CUDAHY, WISCONSIN LADISH CO., CUDAHY, WISCONSIN LADISH CO., CUDAHY, WISCONSIN



44" x 288" Landis Tool Roll Grinder in large steel mill

Landis Tool Type 30 Roll Grinders make it easy to get exactly the same amount of crowning or concaving when regrinding the roll as it had originally.

An adjustable crank pin type of crowning and concaving mechanism can be pre-set to the desired amount. No need to cut and try—the exact setting can be determined the first time. In addition, the contours are always symmetrical on each end of the roll body because it depends on the adjustment of eccentricity of the crank-pin.

In addition, operation is centralized on the travelling wheel carriage for convenience and ease of operation. Solidly mounted stationary bed and pressure lubricated wearing surfaces help assure accurate, smooth finishes.

For full information on the design and construction features, ask for Catalog V41. 31A

LANDIS TOOL COMPANY
WAYNESBORO, PENNSYLVANIA

LANDIS TOOL
Precision Grinders

Advertisement FEBRUARY, 1947

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Testing for Temper Control

Since fabricators of metal goods use more than one source of supply for the metals which go into their products, most of them set up specifications in order that there will be dependable uniformity, regardless of which source of material they are using.

Human Error Limits Value of Specifications

When the fabricator takes on a new source of supply, he often submits specifications for temper such as the Rockwell hardness number, tensile strength, grain size, etc. This is the accepted practice. Nevertheless it has its limitations because of the human element involved when tests are made.

For example, take the matter of grain size determinations. How close will different laboratory operators come to judging the grain size of the same sample? Where grain size determinations are frequently made, a certain procedure is set up and the personnel that does this job is trained along certain lines in order that grain counts will be reliable. Grain determinations between two different laboratories, however, may vary considerably.

Experience over many years has taught us that the best practice is for metal fabricators to submit to us one or more samples representative of the kind of metal and temper which they have found is entirely satisfactory with their type of equipment and operations. Our Laboratory then carefully analyzes the sample for chemical composition and determines which of our standard alloys should be supplied to duplicate it.

Another portion of the sample generally undergoes physical testing for Rockwell hardness, grain size, and tensile strength. When our Laboratory tests on the fabricator's sample disagree with the specifications which are sent in by him, we notify him of the differences which exist and tell him the range in physical properties which we must have in order to make the materials within practical limits. We are just as anxious as our customers are to see that material which we furnish will meet his requirements.

Detailed Records Aid in Duplicating Quality

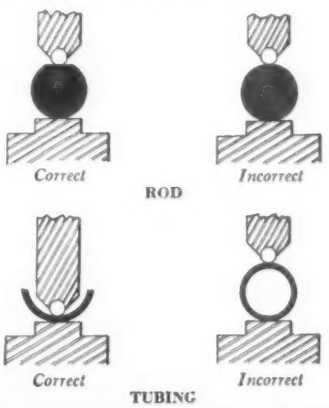
In order to maintain the uniformity of product on subsequent orders, we establish a record of the physical properties of the material furnished on the first order after we are assured that it has satisfactorily met the requirements of the fabricator. We also have a record of the processing operations which the material has undergone in our mills. Consequently, we can duplicate the procedure on subsequent orders. Based on these records the Laboratory is in a position to test the finished metal to make sure that it meets the required specifications.

In cases where the fabricator is starting on a new job and does not have a sample to submit to the mill with his first order, we often recommend that a small experimental order be put through and that the material then be used to make the article in question. If the material is satisfactory in every respect, then the order for the full amount should be placed in the mill. This procedure is followed only in cases where there is some question as to the correct quality.

If the first sample lot is not entirely suitable, another one should be made, until the correct alloy and temper are determined. In previous Copper Alloy Bulletins we have tried to emphasize the importance of using the proper material in order to obtain the greatest efficiency and the minimum of defective and rejected products.

A — *Incorrect* B — *Correct* C — *Incorrect*

A. Note distortion in thin sheet. **B.** Note lack of distortion in thicker sample and good contact between penetrator, sample, and anvil. **C.** Note poor contact between sample and anvil.



Since our Laboratory has specialized in the testing of copper-base alloys for over half a century, it is natural that we are in a position to help the laboratories of our customers, who use many different kinds of materials in their products, which require different types of testing.

Follow Test Recommendations of A.S.T.M.

One of the quickest and most widely used testing instruments for temper is the Rockwell tester. We find that tests made with this instrument are not influenced very much by the human element, provided that the tests are made in accordance with the recommendations given by the American Society for Testing Materials, described under E 18-42. This specification describes the Rockwell hardness tester and sets up the proper procedure, and tells when the various hardness scales should be used. The table below indicates this for strip metal testing.

B. and F. Rockwell for .020″ thick and heavier

30T Rockwell for .012″ thick and heavier.

The reason for these limitations is that an "anvil" effect is encountered in testing thinner metal. Experience has shown that tests made on several thicknesses of strip are not comparable with tests made on the same material or thickness equal to the total thickness of the packed sheets. Another precaution that must be observed is proper contact between the sample, the penetrator, and the anvil. This can usually be accomplished by the use of a small diameter anvil. Samples not perfectly flat should be tested with the concave side up, as shown in the illustration.

Hardness Test for Rod

The methods for testing rod are not as well standardized as tests on strip and sheet. It is obvious that tests on the convex surfaces on rods are not comparable to tests on flat, smooth surfaces on sheet, and that tests of this type may be affected by the diameter of the rod.

With large rod the effect is not so pronounced, but experience has shown that most consistent results are obtained by filing a flat surface about $\frac{1}{8}$″ to $\frac{5}{32}$″ in width on the longitudinal surface of the rod. While this method may not always be indicative of the hardness of the rod over the entire cross section, it is a very satisfactory means of controlling the uniformity of the product.

Rockwell tests are not generally used for

(Continued on Page 2, Col. 2)

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

GALVANIC CORROSION

Laws Governing Galvanic Corrosion

There are two laws which nicely describe the intensity of the attack which occurs in the galvanic couple—Ohm's law and Faraday's law.

Ohm's Law

Ohm's law in corrosion studies is usually used in the form $I=\frac{V}{R}$. It is evident from this equation that variations in the potential difference (V) between the two dissimilar metals and the total resistance (R) have a very definite effect on the amount of current (I) flowing in the galvanic circuit.

Faraday's Law

The amount of metal which is removed from the least noble and corroding metal (anode) by galvanic corrosion follows Faraday's law, which states that one gram equivalent weight of metal is dissolved by 96,500 coulombs (current of one ampere flowing for 96,500 seconds).

It follows, therefore, if the intensity of the current flowing in the galvanic circuit and the area of the corroding metal are known the intensity or depth of corrosion can be mathematically calculated.

Reducing Galvanic Corrosion

Further consideration of Ohm's law indicates that the lowering of the potential difference of a galvanic cell will lead to a reduction in the amount of current flowing, which in turn means that the amount of corrosion is reduced. An increase in the resistance of the galvanic circuit will also lead to a reduction in the amount of corrosion.

A reduction in the galvanic potential can be accomplished in practice by (1) selecting materials which are close together in galvanic series or (2) by applying an opposing potential—usually a low DC voltage from a generator or rectifier. An increase in resistance can be obtained through (1) insulation of the dissimilar metals, (2) keeping the dissimilar metals far apart, (3) adding a corrosion inhibitor or polarizer to the corrosive solution, (4) coating the cathodic surface (non-corroding member of couple) with paint, tarry material, etc. It is dangerous to coat the anodic (corroding member of couple) surface since a break in the coating may result in highly localized corrosion due to the small anodic area.

Testing for Temper Control

(Continued from Page 1)

rod or wire less than $\frac{3}{16}$" in diameter, although the use of the superficial test may permit tests on smaller sections.

Methods of Testing Tubing for Hardness

Tests on full size tubing are subject to the same difficulties as tests on unfiled rods. They are also subject to error because of the hollow core. In many cases the test load is great enough to cause permanent distortion of the tube cross-section. For this reason tests on tubing are made on the concave longitudinal surfaces of split samples. There are of course theoretical objections to tests made in this manner, and the smaller the tube diameter, the more valid these objections become.

It is obvious that tests cannot be made on samples so small that the side of ball holder touches the sample. Experience has shown that tubes $\frac{1}{2}$" in diameter and .030" in wall thickness may be tested in this manner with consistent results. The wall thickness may be reduced to .020" if tests are made with the Superficial Rockwell.

It must be emphasized that tests on rod and tubing are not as exact as tests on sheet. For control purposes, however, tests made as suggested above may be used with considerable success.

We recognize that many fabricators do not have fully equipped laboratories but perform certain tests which give them a good indication of the uniformity of the temper of their materials. However, results of such tests may not give us sufficient indication of the physical properties of the material. Consequently, we require a sample of satisfactory material so that our Laboratory can correctly determine its properties.

Bridgeport's Technical Handbook

Users of copper-base alloys will find much useful information covering the range of alloys, composition, physical and mechanical properties, applications and specifications in Bridgeport's Technical Handbook. The 128-page booklet also contains many helpful weight tables. Write for your copy on company stationery.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Small Punch Press recently announced is said to be adaptable for stapling, marking, riveting, piercing, blanking, forming and drawing of metals, plastics, fabrics and leathers. Requires less than 1 square foot of bench space. Pushbutton control can be located so that operation is automatic when work is fed into machine. **No. 748**

New Rough Boring Tool said to be suitable to both production and jobbing operations, is designed so that blades form cutting block. Construction facilitates quick changing of cutters, adjustment of cutter size before mounting in bar and positive centering of cutter in bar. Locating feature automatically centers cutter, thus equalizing load of cutting elements. **No. 749**

High Speed Grinder has been developed which can be set on bench, hung from hook or suspended from operator's belt for complete mobility. Manufacturer states three sizes available for light, medium and high speed grinding, burring, filing, sanding or polishing. **No. 750**

Vibration Measuring Unit has been announced which manufacturer claims will accurately detect sources of wear, strain and noise in new product development and in equipment manufacturing or test processes. Unit is integrated amplified vacuum tube voltmeter with cable attached. It registers deplacement, velocity and acceleration on calibrated meter dial. Prod is equipped with interchangeable fittings which permit innumerable applications. **No. 751**

New Flaw Detector is said to be able to detect and count holes, weak spots, and conducting paths in thin materials such as sheet rubber, sheet mica, plastics and enamel films on wire during the manufacturing process. Applications include detecting places of low dielectric strength in insulating materials and holes in materials which must resist the passage of light or air. **No. 752**

Small Recirculating Pump has been announced which is said to deliver 2 gallons per minute at 72-inch head. It is designed for use in evaporative coolers, for circulating coolants in lathes and other machine tools, for spot welding and for other industrial uses where small pumps are required. It is 10 inches high, weighs 7 pounds, uses a 1/50-horsepower motor. **No. 753**

Box Body Chuck recently developed is said to facilitate production work on objects of irregular shape such as valve parts and pipe fittings. It is self-centering and power operated. Work-holding jaws are soft and easily adapted to size and shape of object to be held. **No. 754**

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL

Warehouse Service in Principal Cities

STRIP AND SHEET—For drawing, stamping, forming, spinning. Leaded alloys for machining, drilling, tapping. Silicon bronze, phosphor bronze for corrosion resistance. Alloys suitable for springs. Engravers' copper and brass.

WIRE—Cold Heading alloys for screws, bolts, nuts, nails, fastenings, electrical connectors, Phono-Electric trolley and contact wires.

ROD—Alloys for screw machine operation. Duronze III high strength, corrosion-resistant, good for machining and hot forging. Hot forging and cold heading alloys. Welding Rods. Copper-covered ground rod.

TUBING—For miscellaneous fabrication. For condensers and heat exchangers. For water, air, oil and hydraulic lines.

DUPLEX TUBING—for conditions too severe for a single metal or alloy.

PIPE—Brass and copper for plumbing.

FABRICATED GOODS—Plumbing brass goods. Radiator air valves. Aer-a-sol insecticide dispensers. Automobile tire valves.

TECHNICAL SERVICE—Staff of experienced, laboratory-trained men available to help customers with their metal problems.

WAREHOUSE SERVICE—Warehouse and jobbers stocks available for prompt delivery in principal cities.

TECHNICAL LITERATURE—Manuals and handbooks available for most products.

"Bridgeport" BRASS CO.

BRIDGEPORT BRASS

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UNIFORM WELDS... *Automatically!*

with G.E.'s *Current Regulator*

The operator of this traveling resistance-welder at the Pullman Standard Car Manufacturing Co., gets consistent welds automatically

Equipped with a G-E electronic current regulator and synchronous control, this resistance welding machine travels the length of the Pullman car producing uniform welds automatically. Each of these welds is of equal strength because the current regulator *automatically compensates for varying line voltage and secondary circuit impedance.*

In welding these cars, two spot welds are made at a time, the spacing between the two varying in accordance with the dimensions of the parts and the strength specifications. As the spacing varies, the length of the secondary circuit changes, and in turn the current is changed.

Where formerly this shift meant frequent readjustments by the operator, guided by an extensive table of machine settings, now just one of two settings is needed, depending on whether the machine is welding Cor-Ten or stainless steel; the current regulator does the rest.

This regulator holds current within plus or minus 2 per-cent of normal, whereas, the unregulated current might vary as much as plus or minus 20 per-cent.

Even when space is uniform, current is affected by varying amount of magnetic material in current loop.

IMPROVES QUALITY

In this, and other applications such as welding propeller blades, metal barrels, etc., this regulator provides uniform quality welds when more or less metal is introduced in the welder throat.

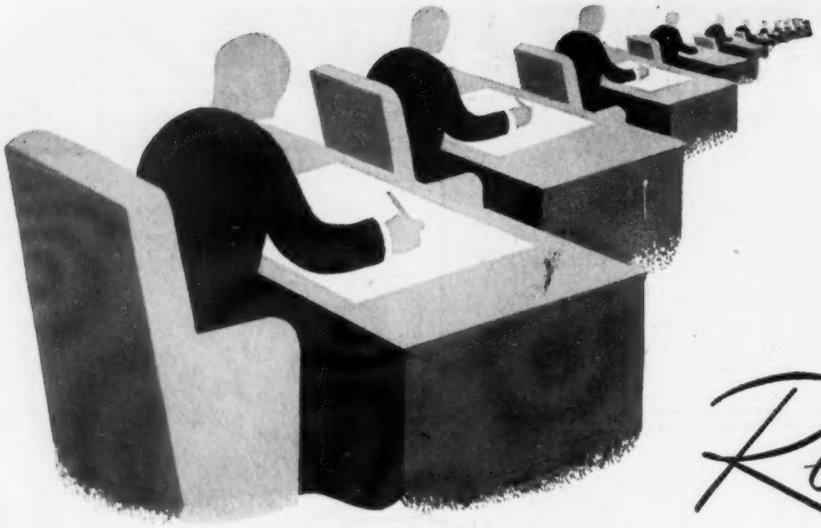
FLEXIBLE OPERATION

The same settings can be used when operating a press-type spot welder, a gun welder connected to the same transformer, or when welding magnetic materials with a press-or gun-type welder.

The current regulator is specially designed for use with G-E electronic resistance welding controls which include heat control by the phase-shift method.

For additional information ask our nearest local office for Bulletin GEA-4220. *Apparatus Department, General Electric Company, Schenectady 5, N.Y.*

GENERAL ELECTRIC



Ready . . .

TO HELP YOU FIND THE PLANT YOU WANT

32 convenient offices

Look at that list of field offices shown below! There is one within easy reach of your home—no matter where you are. And each is organized to give you fully-rounded service . . . help you select the plant you want . . . from the wide range of surplus plants offered by the War Assets Administration.

While you may know of many wartime plants which have been acquired recently by private industry, the fact remains that your Government still has hundreds of choice large and small industrial facilities for sale or lease. And these plants, with or without equipment, may be negotiated for in whole or in part to suit the requirements of a particular business, big or little.

If you can qualify as a "small business", you will find that a *high priority* is available for your purchase of a plant through the Reconstruction Finance Corporation. Our field offices will advise you how to obtain this priority certification from RFC.

If you are thinking of *expanding* your production, *modernizing* your facilities, *adding* a new process, *relocating* your business or starting a *new* enterprise—make your needs for plant and equipment known to the War Assets Administration office nearest you. It is one of the 32 regional offices set up for the sole purpose of helping you get the plant you want.

Write, phone or call for the PLANT-FINDER, a fully indexed, descriptive catalog of Government-owned plants.

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OFFICE OF REAL PROPERTY DISPOSAL

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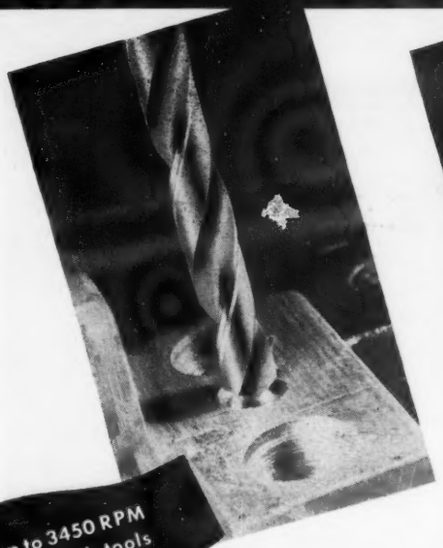
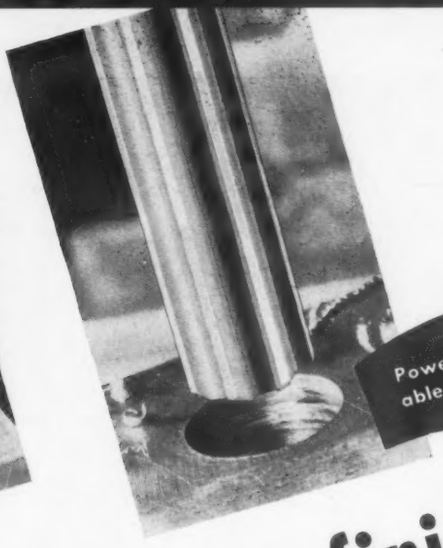


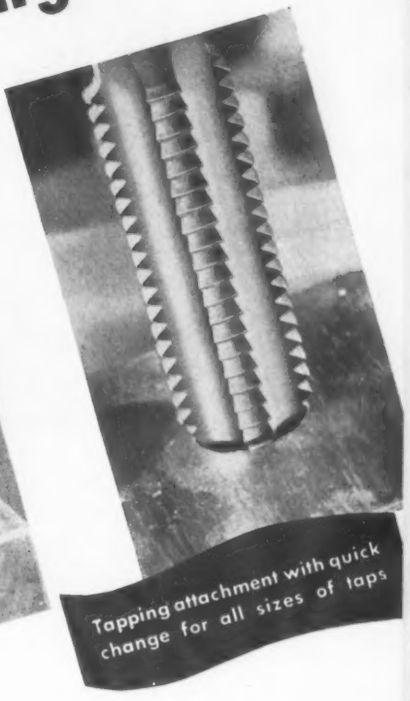
Speeds up to 3450 RPM to handle small tools



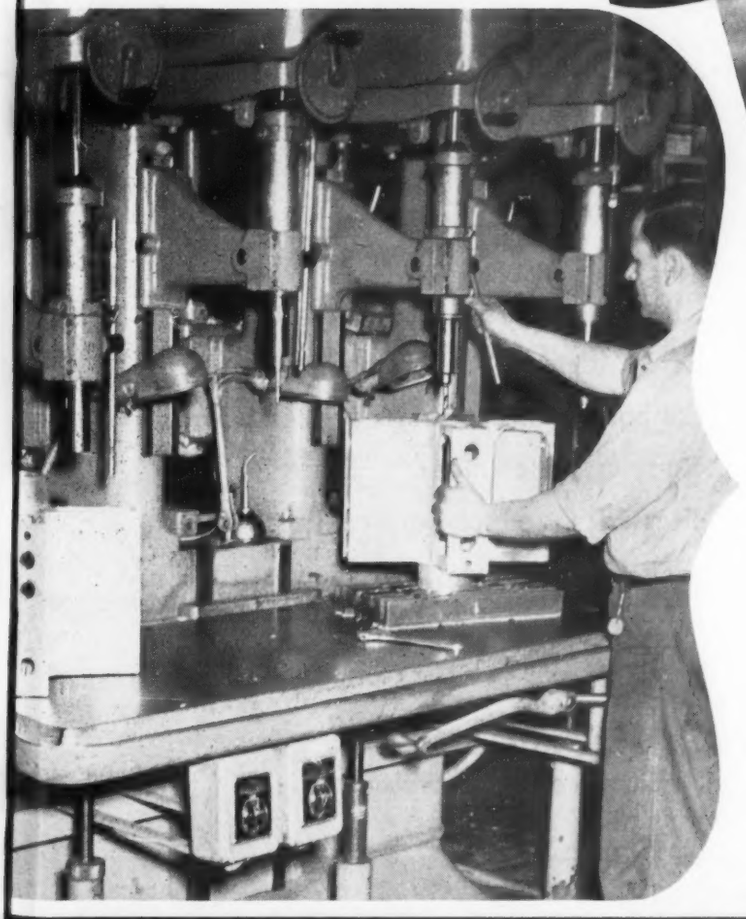
Power feed attachment available for drilling and reaming

a wide range drill for finishing castings

Back Gear Unit for slow speeds in tough steel



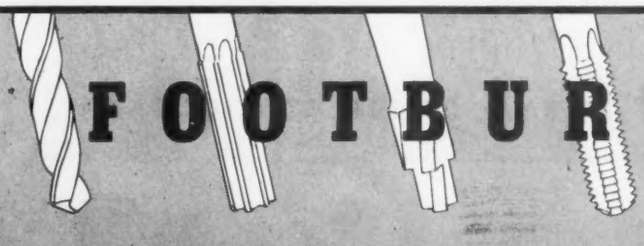
Tapping attachment with quick change for all sizes of taps



For successive operations of drilling, reaming, counterboring or tapping, the No. 2 Sensitive Drilling Machine is ideally suited. With back gear unit, power feed, tapping attachment and high and low speed range, the most efficient arrangement is available for all types of operations. Two, three, four or six spindles are standard on 10" centers, but various arrangements with regard to number of spindles and center distance may be easily made to meet specific requirements.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building



FOOTBURT

Sensitive **DRILLING MACHINES**

Complete Heat Treating Service With *Six* UPTON ELECTRIC SALT BATH FURNACES

Furnaces illustrated from left to right: Draw, Isothermal Quenching, Preheating and Neutral Hardening, High Speed High Heat Quenching and Neutral Hardening, Carburizing.

THE Dayton Forging and Heat Treating Co. selected Upton furnaces to provide *complete* heat treating service for its customers. Six Upton Electric Salt Bath Furnaces with Sealed-In Electrodes assure the uninterrupted and uniformly accurate heat treating of any work between 300° and 2500° F.

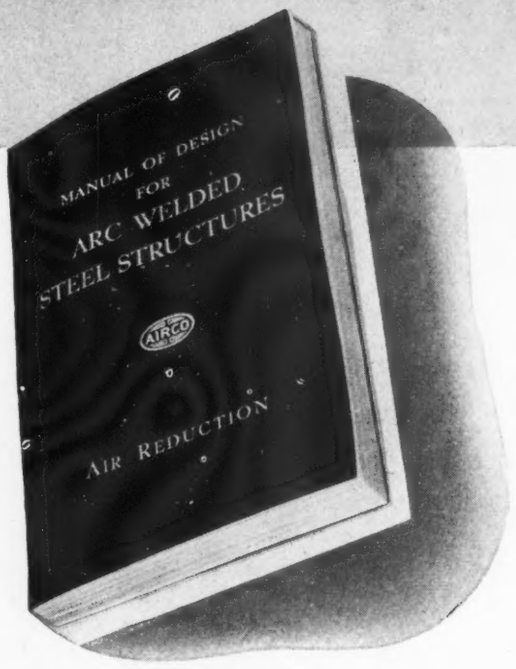
The six furnaces in this illustration are all 54″ deep! Sealed-in electrodes at the bottom of each furnace (24″ below floor line) eliminate changing of electrodes, reduce surface area—and resulting losses from radiation—remove all chances of burning or shorting work.

Upton furnaces can be built to Any Size to accommodate Any Type of work. Send for recommendations—without obligation on your part.

Upton ELECTRIC FURNACE DIV.

7455 MELVILLE AT GREEN • DETROIT 17, MICHIGAN

YOU are invited to examine this book *Free!*



Here is the first book of its kind ever published — the "Manual of Design for Arc Welded Steel Structures." It is handy, useful, bringing you a wealth of information covering design, materials, inspection, estimating, and engineering control of welding and related operations . . . tables of standardized welded connections for all sizes of beams . . . AND a series of diagrams for the rapid design of special connections.

These few chapter headings give you some idea of the vast amount of material covered by this definitive 300-page work:

- ★ General Characteristics of Design for Welded Construction
- ★ Types of Welds and Joints, and Weld Sizes, Arrangement of Details
- ★ Specifications for Welded Buildings, Bridges and Similar Structures
- ★ Proportioning Welds for Allowable Stresses in Building Construction
- ★ Economical Weld Sizes and Groove Forms
- ★ Diagrams for the Rapid Determination of Allowable Eccentric Loads on Welded Connections
- ★ Standardized Welded Connections for Simple Framing and Tables of Allowable Loads on Beams and Piece Marks for Welded Connections
- ★ Estimating Electrode Requirements, Weight of Deposited Metal, and Cost Factors

But see the book for yourself . . . simply send us your check or money order for $2 — $ look the book over for five days; then, at the end of this period, if the book does not meet your requirements, just return the book to us, and we will refund your money.

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AIR REDUCTION, 60 East 42nd Street, New York 17, N. Y.
Send us a copy of "Manual of Design for Arc Welded Steel Structures." We have attached the $2 charge, which will be refunded to us (when we return the book to you) if the book does not meet our requirements.

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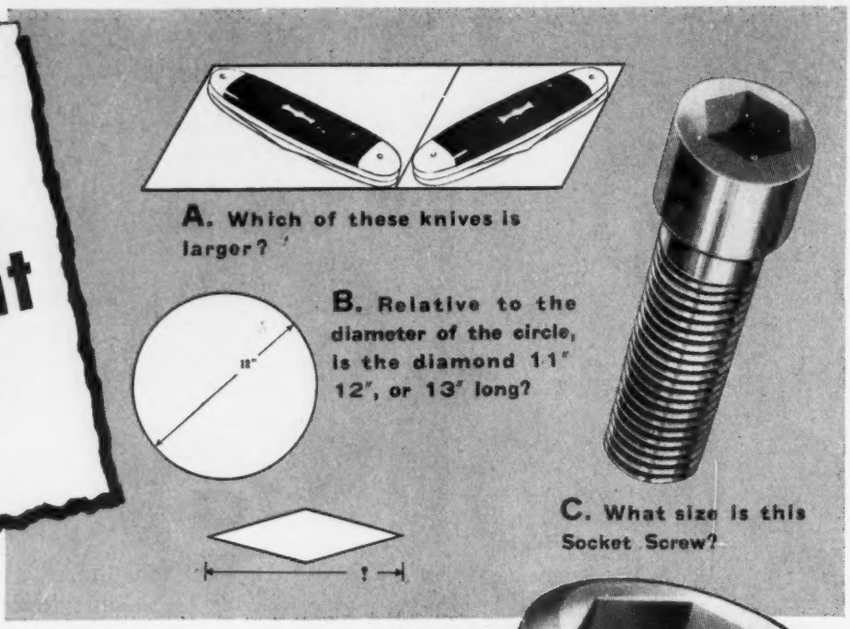
Can YOU Guess Right on Size?


A. Which of these knives is larger?
B. Relative to the diameter of the circle, is the diamond 11" 12", or 13" long?
12"
?
C. What size is this Socket Screw?

GUESSING is fun in a game . . . but there's no place for it in shop practice. Wrong guesses cost money . . . and they happen more often than you think. For example, the size and thread pitch of the socket screw above was guessed wrong by many veteran shop men questioned in a recent test. On the job . . . such mistakes waste time.

There's no need to guess...

WHEN IT'S SIZE-MARKED

Just a quick glance at the head of any P-K Cap Screw reveals its size. Clearly incised, easily read, the Size-Mark represents a big forward step in the simplification of assembly operations.

Experienced men like the Size-Mark because it saves their time. Green hands are all for it because it protects them from errors. Tool crib bosses want it because it speeds up the sorting of left-over, mixed-up screws. And the men who service your products will appreciate the Size-Mark because it saves their time on reassembly jobs.

Are you missing this opportunity to aid your assembly workers – to speed up assemblies – and to provide an extra sales feature for your product?

Plus – GEAR GRIP*

Gear Grip on Size-Marked Socket Head Cap Screws is a further aid to fast work . . . makes them slip-proof even when fingers are oily. Write today for samples . . . Parker-Kalon Corp., 202 Varick St., New York 14, N. Y.

ANSWERS:

A. Both are the same. B. The diamond is 13" long.
C. There's no question when it's P-K Size-Marked!

* U. S. Pat. No. 126,409

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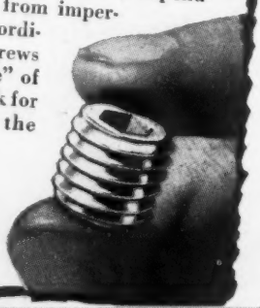

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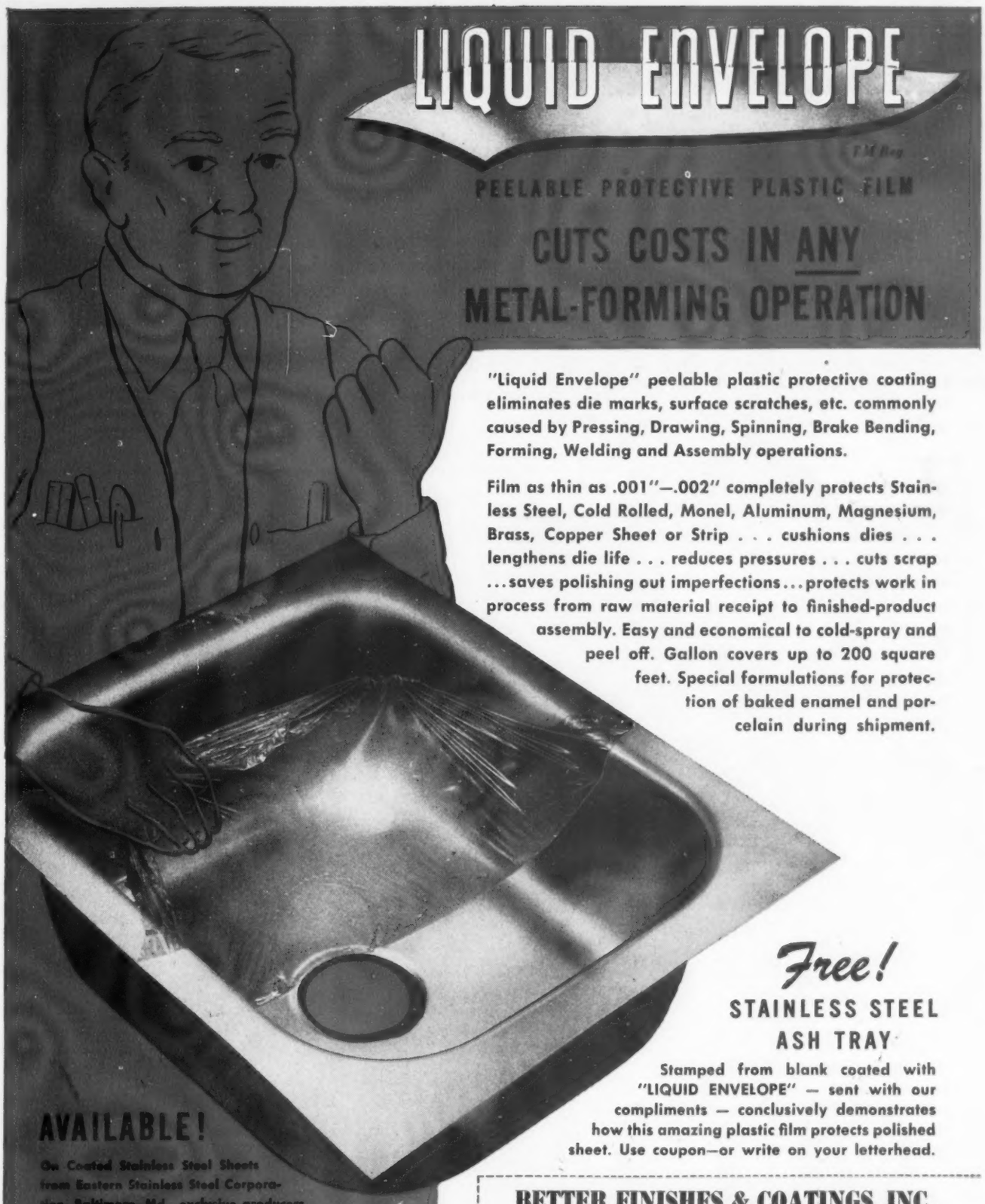
PARKER-KALON *Cold-forged* SOCKET SCREWS



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PEELABLE PROTECTIVE PLASTIC FILM

CUTS COSTS IN ANY METAL-FORMING OPERATION

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Increase shop efficiency and you increase production capacity. Work moves smoothly, swiftly, surely, and in greater volume, through the efficient shop. Modern, efficient, precision machine tools are one of the first essentials for maximum efficiency.

Famous for versatility, South Bend Precision Lathes bring peak efficiency to shops where frequent changes of set-up are called for and a variety of materials are used. And their modern design, with convenient controls and full quick change gear equipment, means less fatigue and less "machine scrap" due to such causes.

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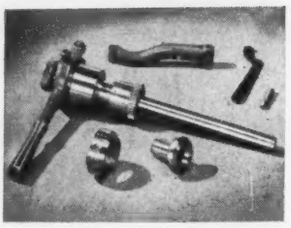
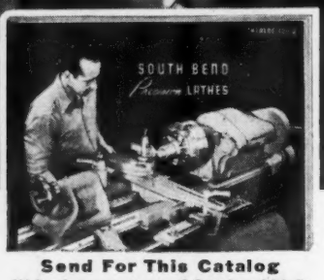


HANDLEVER COLLET ATTACHMENT
Permits releasing and feeding bar stock through the collet without stopping the lathe. Available with hardened ground steel collets, soft brass collets, or a combination of both. Write for Catalog No. 77 which shows all attachments.

Machining to split-thousandth accuracy is easy with a 16-inch South Bend Precision Toolroom Lathe.



Send For This Catalog
Write for your copy of Catalog 100-D which shows in color all styles and sizes of South Bend Toolroom, Turret, and Engine Lathes. Made with 9", 10", 13", 14½", and 16" swings. Accessories and attachments also shown.

SOUTH BEND LATHE WORKS
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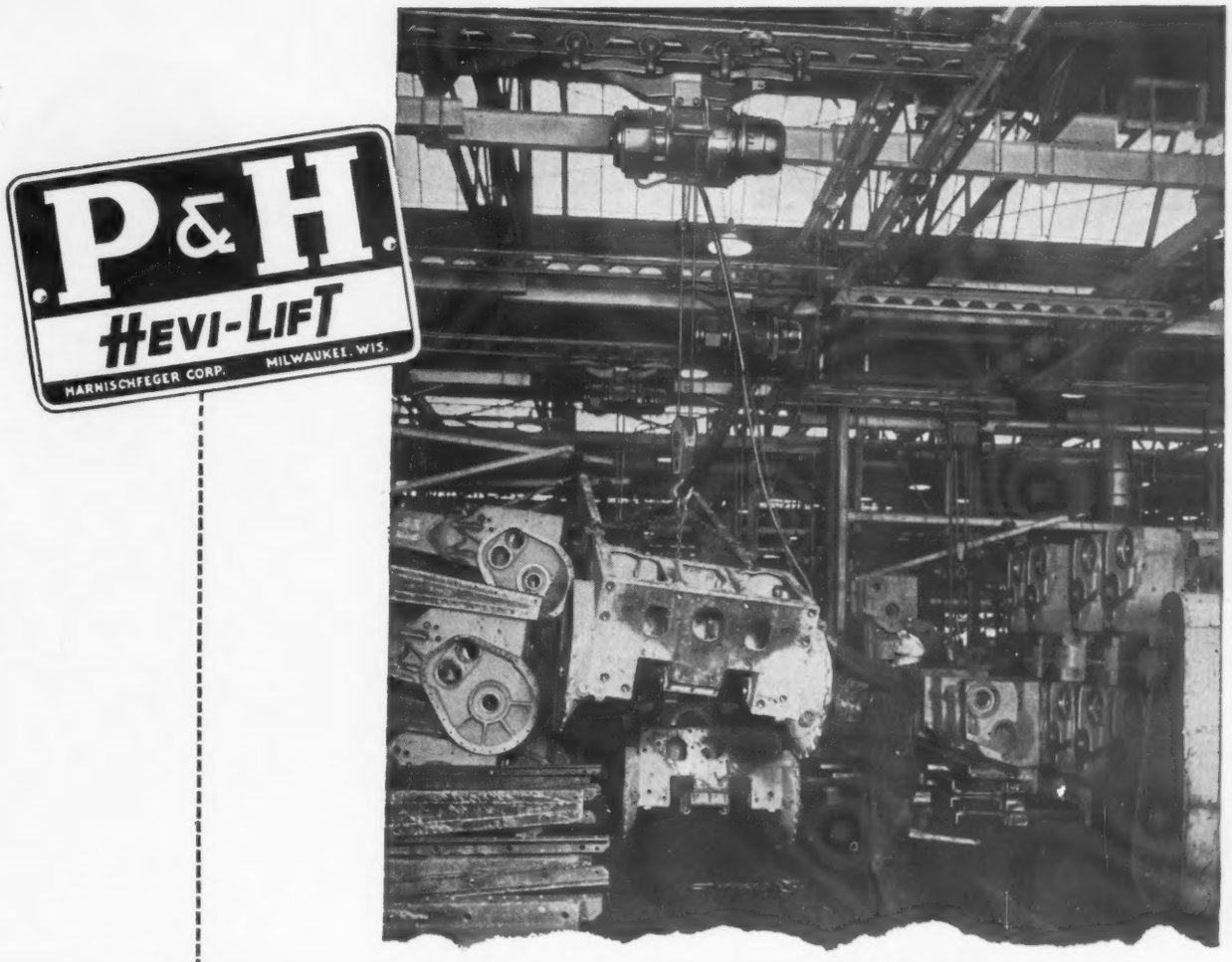

YOUR BIGGEST LOADS ARE ONE MAN JOBS

—when you move them "THRU-THE-AIR!"

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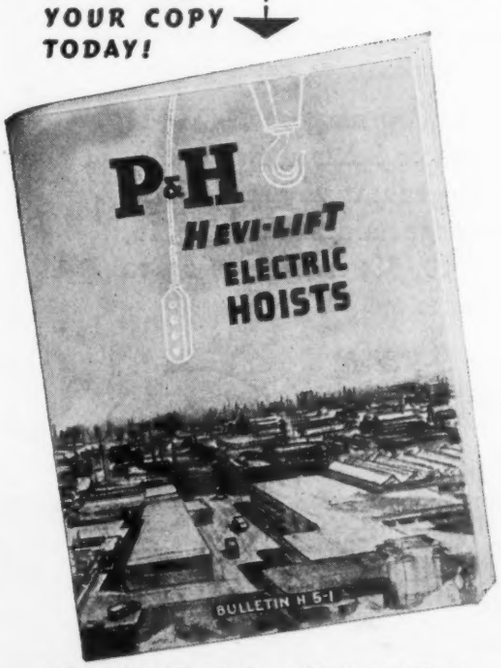

Bulletin H5-1 tells all about P&H Hevi-Lift Electric Hoists . . . where they're used . . . what kind of jobs they do. 50 pages of pictures and specifications. Get your free copy now!

Yes, *one man* does it all! Lifting . . . moving . . . "spotting" heavy loads exactly where they're wanted. And he does it all by pushing buttons!

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(3) **SAVE SPACE** . . . "Thru-the-Air" handling leaves floor space free.

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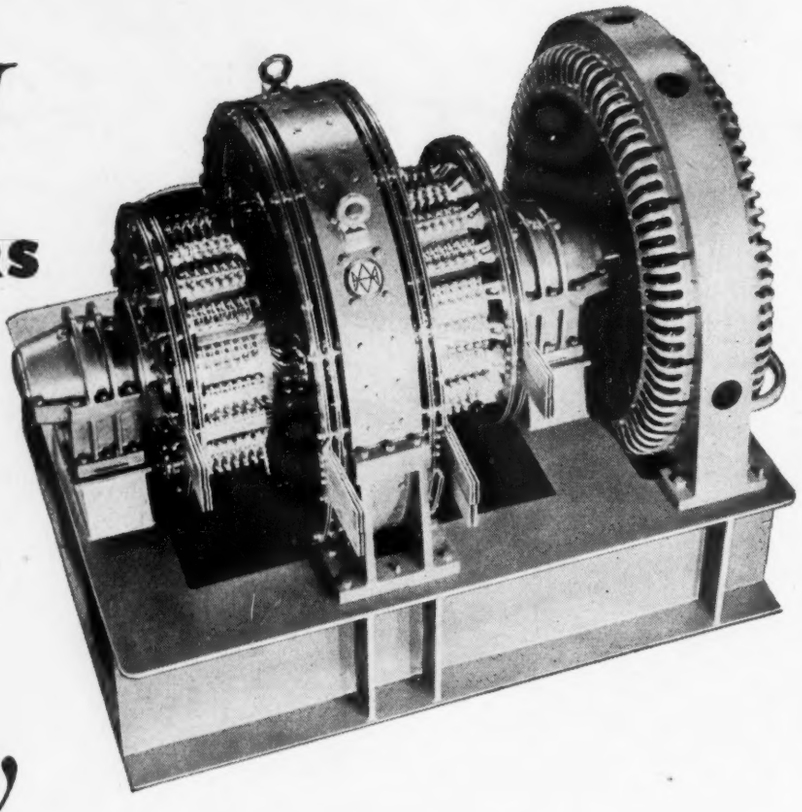
H-VW-M

GENERATORS



FEATURING

Versatility

FEATURES built into H-VW-M generators qualify them for many types of service, appeal alike to electroplaters, anodizers, electrotypers, producers of electrolytic chemicals, metal refiners. Among these features are:

Core-ventilated laminated armatures of non-aging silicon steel • Low-loss laminated fields • Generous sleeve-type bearings with oil-rings — for long, quiet operation, easy maintenance • Wide voltage range or stable voltage characteristics, as needs require.

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H-VW-M generators are built in standard voltage ratings of 6, 9, 12, 15, 18, 25, 30, 40, 50; in ratings up to 25,000 amperes.

Write for H-VW-M Generator Bulletin

HANSON-VAN WINKLE-MUNNING CO. MATAWAN, NEW JERSEY, U.S.A. SINCE 1820

2391

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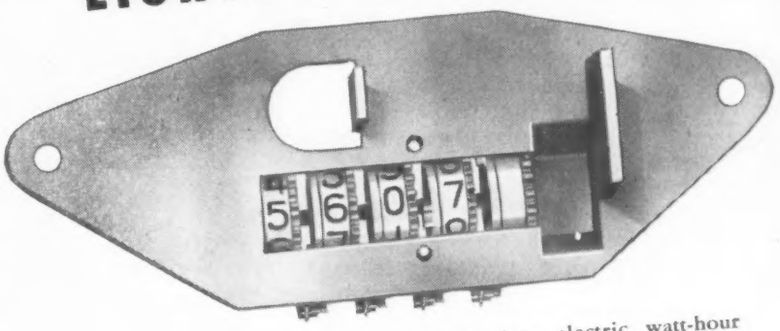
COUNT on LIGHTS

...and here's how their LIGHTS ARE COUNTED



Veeder-Root Watt-Hour Counter, built into electric watt-hour meters. This counting device gives the farmer direct reading of current consumption in number of watt-hours.

Lanternlight for chores always appealed to poets — but not to practical farmers. And now, in certain sections of the country, the instant command of adequate electricity has lightened the farmer's work in more ways than one . . . and put an end to a dread fire-hazard, too.

Extended to farmers in outlying districts, the comfort, safety and greater work-capacity of electric light and power have had a whole lot to do with today's amazing farm productivity.

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In England: Veeder-Root Ltd., Dickinson Works, 20 Purley Way, Croydon, Surrey.

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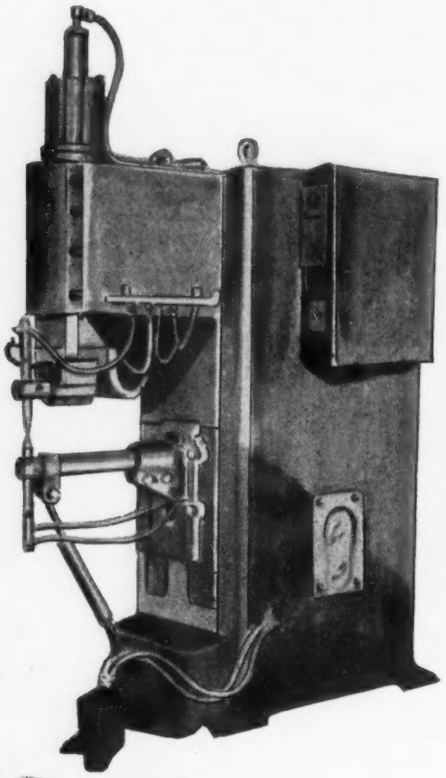
Advise any of the Regional Offices listed below of your needs. You may inspect any machine before purchase and buy without delay. You will help yourself and your country. All items are subject to prior sale.



RESISTANCE SPOT WELDERS:

TYPES AVAILABLE: Rocker Arm, Press, Portable or Gun, and some Multi-electrode in well-known makes.

RANGE OF SPECIFICATIONS: Motor, air, hydraulic or manual drive; 10 to 400 KVA; 220-440 volt, 60 cycle, single phase; throat depths 8″ to 48″; synchronous and non-synchronous.

CONDITION: Mostly used, some unused.

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RANGE OF SPECIFICATIONS AND CONDITION: Same as Spot Welders.

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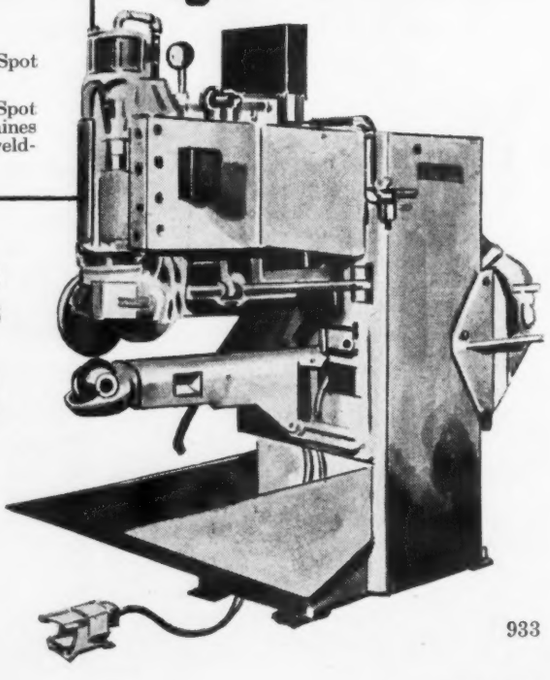

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EXPORTERS: Your business is solicited. If sales are conducted at various levels you will be considered as a wholesaler. Any inquiries regarding export control should be referred to the Office of International Trade, Department of Commerce, Washington, D. C.

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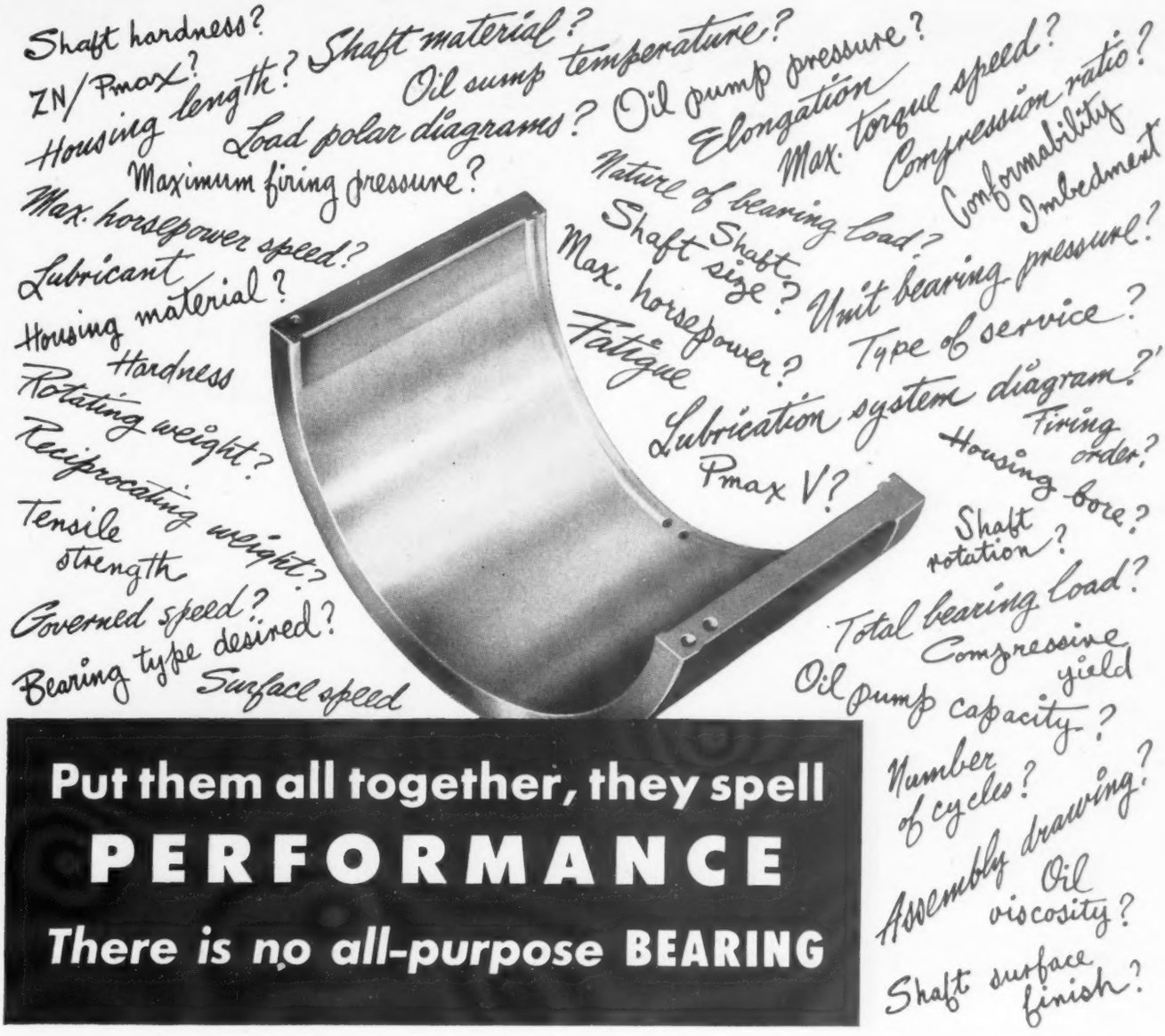

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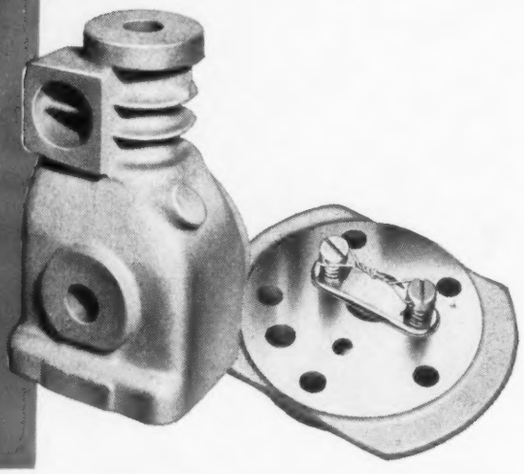

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STEEL

The Magazine of Metalworking and Metalproducing

VOL 120, NO. 7 FEBRUARY 17, 1947

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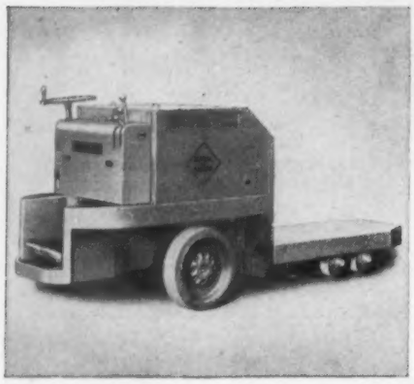

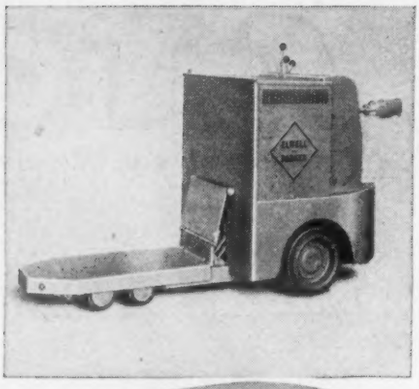

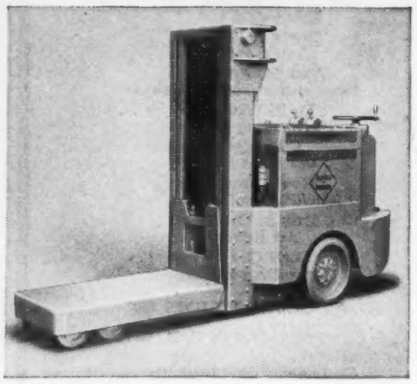

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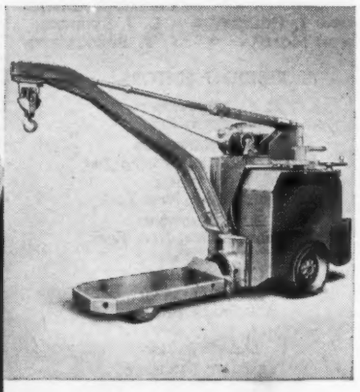

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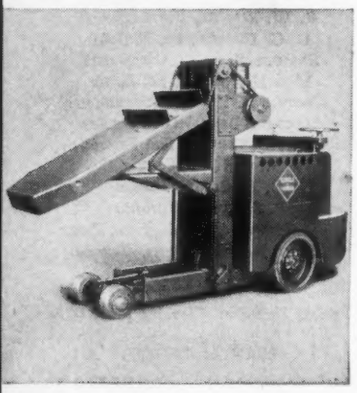

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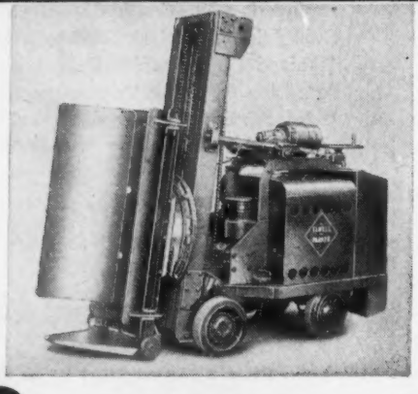
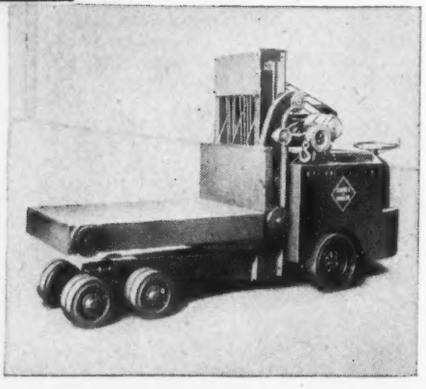




ELWELL-PARKER

Established 1893

POWER INDUSTRIAL TRUCKS

February 17, 1947

Crisis in Britain

Britain's present predicament may appear to be of little concern to the United States, but we will be making a mistake if we underestimate its effect upon our own affairs.

Ordinarily, a severe winter in the British Isles would not lead to important international repercussions. Business activities would be curtailed and people would be inconvenienced but after a few weeks of emergency, conditions would snap back to normal and little permanent harm would have been done.

This time the situation is different. The prolonged cold spell came at a time when the capacity of the British people to endure new hardships and discouragements was the lowest it has been in centuries. War weary, still handicapped by shortages of food and manpower, burdened with a terrific problem of exporting enough goods to build up credits for imported necessities and governed by a new labor regime which is putting reform and experiment ahead of recovery, the British public is not likely to dismiss this crisis as if it were an unavoidable act of God. If English tradition rings true, this current mess is going to cause the man in the street to question the present trend of national affairs. He will ask himself whether the Labor government's program of nationalization is what England needs in its present hour of trouble. He is going to ask whether it is necessary for British men and women to be pushed around arbitrarily by bureaucratic officials in peacetime in order that the empire be restored to a stable economy.

In seeking answers to these questions he will learn at close range what we in America can see from afar, namely that the Labor party's venture into socialism, even on the limited scale originally contemplated, cannot stop short of virtual totalitarianism. Already the tentacles of nationalized banking and coal mining are reaching out to strangle industrial units that are not yet nationalized. A country's free enterprises cannot long remain free when some industries are nationalized.

Whether our British cousins will see this danger in time to extricate themselves from its clutches remains to be seen. Their decision will be highly important to us in the United States. With Great Britain as an ally in type of government as well as in speech, our responsibilities in the postwar world would be lightened materially. A Britain speaking our language but with a form of government differing radically from our own would make our postwar job extremely difficult.

* * *

BRUSH-OFF COURTEOUS: If complaints voiced in frequent telephone calls to this office can be judged a criterion of customer opinion, sellers of steel—particularly flat rolled steel—are in danger of being woefully misunderstood.

Typical of these complaints is the small consumer who declares that during recent weeks his attempts to obtain commitments from mills have met with worse than the ordinary curt brush-off. More often than not, he has gained the impression that the mills are interested only in supplying the big customers and that the little fellow can go to hell.

That this conviction is growing rapidly among small customers is unfortunate for two reasons. First, it isn't generally true. Some sellers may be pursuing a short-sighted policy, but most mills are trying to allocate their tonnage equitably. Many aggrieved small buyers would feel better if they could know, as we know, that some of the biggest consumers have fewer days' supply of steel on hand than their most loudly complaining small contemporaries.

Secondly, it is unfortunate that a seller should

(OVER)

incur the animosity of a buyer now. Sooner than we realize, the seller will be looking for customers.

Admittedly the situation today is tough, but if the brush-off must be administered, let it be as courteous and as helpfully explanatory as possible.

—pp. 62, 73, 135

• • •

INCONSISTENT FOR U. S.: American shipbuilding is cursed with more violent ups and downs than any other industry. From a peak of 5,085,684 deadweight tons launched in 1919, volume of shipbuilding in American yards declined to a low of 15,180 tons in 1934 and then soared to a World War II peak of 18,521,534 tons in 1943. Tonnage in 1946 was only 933,787 and the decline will continue.

The present bleak outlook for shipbuilding is due to the prohibitive cost of American-built vessels. As badly as foreign nations need ships that could be built here, they cannot afford the price, which is double or more the cost of vessels constructed overseas. This is because wages in American yards average $1.43 per hour compared with 50 to 65 cents abroad. Similar wage disparities work against the American operation of ships.

It seems inconsistent that a nation that has been so successful in many industrial pursuits should resign itself to a mediocre position in world shipbuilding.

—p. 57

• • •

FOR BETTER OR WORSE: This nation is venturing into uncharted waters in foreign trade. In recent weeks businessmen have had an opportunity to testify at hearings conducted for the purpose of airing all views relative to the administration's reciprocal trade agreements program. Now that the hearings have been concluded, a Trade Agreements Committee, named by Undersecretary of State William L. Clayton, will digest the testimony and go to Geneva, where beginning Apr. 8 it will confer with representatives of 18 other nations and negotiate trade agreements.

The threat of a minority of Republicans to sabotage this program seems to be losing momentum. It is admittedly unfortunate that interested persons did not give more attention to this subject before the eleventh hour. Most informed citizens feel that the nation's dominant role in postwar world affairs calls for a new approach to the foreign trade problem.

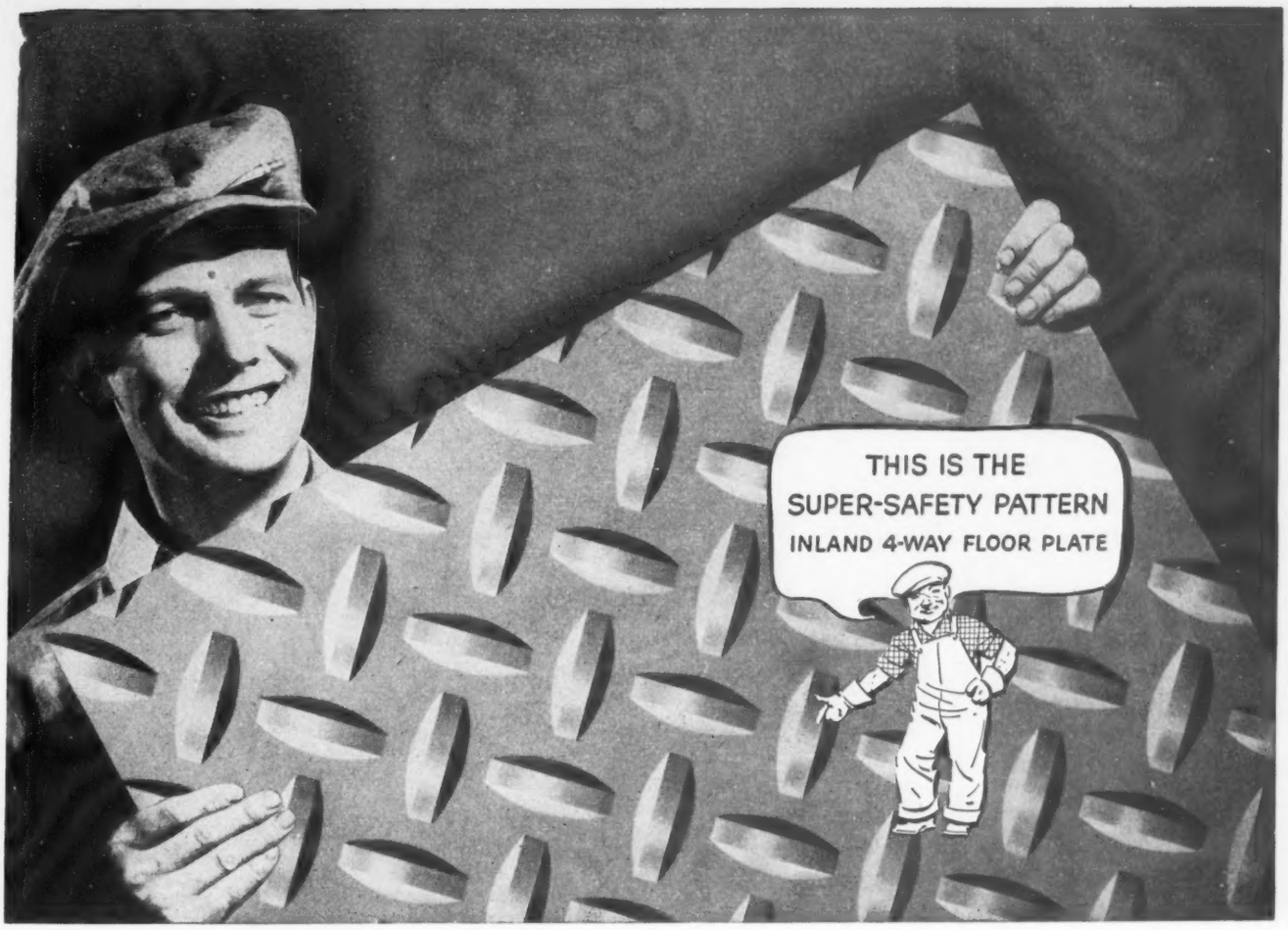
The Geneva conference is part of that approach and everything possible should be done to make it successful.

—p. 66

SIGNS OF THE TIMES: National Industrial Conference Board reports that the "little fellow" is entering business in large numbers. Already more than three-fourths of the wartime decline in the number of firms has been recovered (p. 78) and it seems probable, according to NICB, that the number of business enterprises may exceed the prewar high by as many as from 300,000 to 500,000. . . . Jones & Laughlin Steel Corp. insulated 3350 ft of a 14-in. exposed elevated steam pipe line with 2½-in. of blanket mineral wool, wire-faced and metal-lath-backed and weather-sealed with two layers of 75 lb asphalt impregnated asbestos felt. The line carries steam at 235 lb at the boiler end, which drops to 215 lb at the delivery end. To the surprise of everybody (p. 107), the temperature differential between initial and delivered steam was only 10 to 15° F of superheat in steam at 550° F. The cost of this effective insulation was about $5.25 per foot. . . . Automobile builders, as well as suppliers of materials and parts, are finding food for thought in the statistics compiled by R. L. Polk & Co. (p. 73) showing that one-third of the decline in passenger car registrations experienced between 1941 and 1944 was recovered in 1946. This indicates that fewer cars were scrapped during the war than had been expected and raises a question as to whether estimates of the accumulated demand for new cars have been pitched too high. . . . St. Lawrence Seaway project will be revived by introduction of a bill by Senator Vandenberg (p. 69) providing that the undertaking be self-liquidating by means of toll charges. . . . The first installment of a two-part article gives important information on flux-injection cutting (p. 86) which permits cutting of stainless steels with results comparable to those attained in flame cutting mild steels. . . . Judge Picard's decision in the Mt. Clemens Pottery case deflates the portal pay balloon (p. 60) but leaves considerable clean-up work for Congress and the Supreme Court. . . . A new high-speed rotary offset lithographic printing press (p. 112) offers toy, can and other small parts manufacturers a tool that may cut the cost of decorating metal. . . . Industry awaits with interest the Supreme Court decision on the unionization of foremen of Packard Motor Co. A vote on unionization by Packard foremen now (p. 74) probably would reverse the 666-435 vote in favor of unionization polled in April, 1945.

E. L. Shaner

EDITOR-IN-CHIEF



Ryerson—Quick Source for

INLAND 4-WAY FLOOR PLATE

Take a careful look at this close-up of Inland 4-Way Floor Plate. Note the 4-way projections.

Now read of the advantages Inland 4-Way Floor Plate provides:

1. *Safer traction* on walkways, stairways, around machinery and wherever sure footing is important. The 4-way projections grip feet or wheels from every angle. Give 4-way protection against dangerous falls.

2. *Longer wear.* Inland floor plate is rolled from tough, open hearth steel with high wear resisting qualities.

3. *Great structural strength.* The overlapping projections reinforce lengthwise and crosswise giving Inland 4-Way Floor Plate greater stiffness. It has a tensile strength of 55,000 lbs. and an elastic limit of 35,000 lbs. per square inch.

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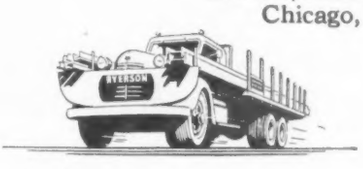

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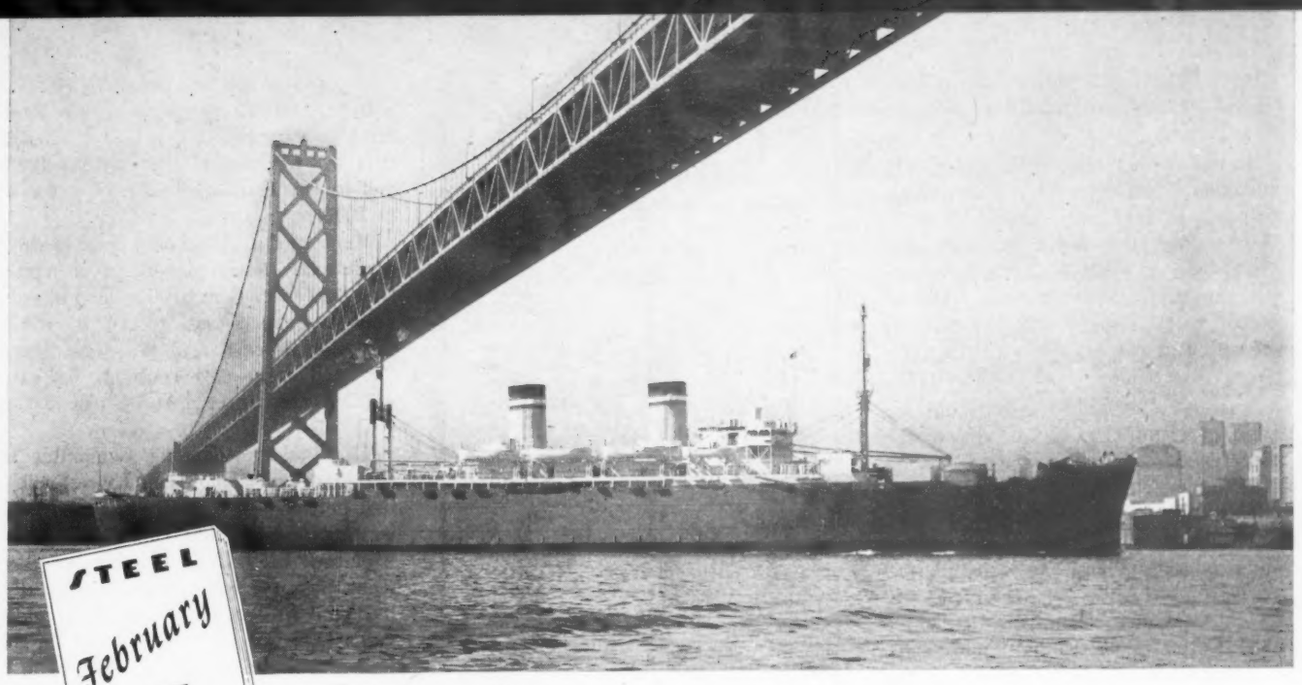


STEEL
February
17
1947

Conversions of vessels built for war duty to peacetime uses are supplying a considerable volume of work for shipyards. This 23,000-ton Navy transport is shown following conversion at the San Francisco yard of Bethlehem Steel Co.

Shipbuilding in Postwar Doldrums

Industry plagued by large surplus of war-built vessels, high labor costs for construction and operation of vessels. Foreign countries need vessels desperately but cannot afford to place contracts here

By W. J. CAMPBELL
Associate Editor, STEEL

SHIPBUILDING, which during the war years was the No. 1 consumer of steel and a heavy user of many metal-working industry products, has slipped back into its peacetime doldrums. From its peak in 1943 when one of every five tons of finished steel went to the shipyards, vessel construction, conversion and repairs last year required less than one half of 1 per cent of total steel output. This year requirements will be even less, and next year may dwindle still further.

Shipbuilders are doleful over prospects for their industry regaining any substantial measure of activity in the years immediately ahead.

Reason for the gloomy outlook for American shipbuilding may be summed up as follows: 1. Surplus of merchant shipping resulting from the wartime construction program; 2. high labor costs in United States yards as compared with foreign yards; 3. high operating costs for ships operating under the American flag, as compared with those operating under foreign flags.

The shipbuilding depression is peculiarly American. Foreign maritime countries, Great Britain, Norway, Sweden and others, have scheduled construction of nearly 1000 merchant ships and activity is limited only by scarcities of steel, other materials, and labor.

A large part of American shipbuilders' difficulties result from the magnificent job they accomplished during the war. As result of the emergency building program, the United States now controls more than half of the world's shipping. This country has 5500 seagoing merchant vessels, aggregating 57 million deadweight tons. More than half of these vessels, however, are slow, inefficient Liberties and similar vessels which cannot be used in the highly competitive world trade. Disregarding these, the United States still has more than enough ships for as large a peacetime merchant marine as can be utilized. Shipping authorities believe this country can maintain an active merchant fleet of 11 million deadweight tons, or about 2 million tons larger than prewar, and that about 25 million tons should go into the inactive fleet.

Included in the war-born fleet is a good range of vessels from which to draw the ships necessary for the peacetime fleet, with the exception of some special types, particularly passenger ships. A number of these will be constructed to round out the fleet.

Not only does this country find itself with a surplus of fairly new ships, but it also has a tremendous surplus of shipbuilding capacity. Under the stress of war the United States created shipyard capacity greater than the rest of the countries combined and the disposition of this vast enterprise now presents problems of serious proportions. The problems include much more than the disposition of the yards and involve hundreds of supplying companies located in all parts of the United States.

Shipyards working on Maritime Commission contracts reached a peak capacity of 25 million tons annually, working on a wartime three-shift basis. Under a normal work-week, these yards had a capacity of about 15 million tons annually.

In addition, about equal capacity was devoted to naval craft.

If the wartime shipbuilding capacity were applied exclusively to simple types of merchant construction, it could have turned out 40 million tons of vessels annually.

Future requirements will be negligible compared with wartime needs. The yards will have some work for a year or two in making up the deficiencies in special types of vessels, especially passenger, a large volume of conversions and reconversions and considerable repair work. This will keep some yards going on a

reduced basis, but it will be only a drop in the bucket compared to wartime activity.

Normal replacements will require only a fraction of capacity. Even if this country were to maintain a merchant fleet of 20 million tons, which has been suggested by some optimists, normal replacements would require only about 1 million tons a year. These would not start at once as most of the ships in the fleet are comparatively new.

American shipyards cannot build for foreign account in peacetime due to the wide differential in labor costs. Foreign fleets suffered huge losses during the war and the maritime countries are anxious to obtain new bottoms, but not at the prices American shipbuilders must charge.

This problem was pointed up recently by E. G. Grace, chairman, Bethlehem Steel Corp., major United States shipbuilding concern. Mr. Grace said the average wage in American shipyards today is $1.43 an hour, compared with 50 to 65 cents an hour in the rest of the world. The result is that ships can be built abroad at "anywhere from one-half to one-third of the cost of our ships, even though steel is cheaper in the United States."

Shipyard wages, Mr. Grace pointed out, are 21 per cent greater than in comparable industries and the present $1.43 average compares with 83 cents in 1939. The result, he concludes, is that shipworkers are pricing themselves out of jobs.

The same wage factors work adversely in the operation of American ships. High rates paid to crew members and other high costs of operation are a big obstacle to American ships competing with those under foreign flags.

Shipyard employment has been cut deeply by the recession in new building. Where about 75,000 were employed before the war, shipbuilding employment soared to 800,000 during the war peak, then plummeted down to 135,000 by the end of 1946.

Despite the sharp drop in shipbuilding, 1946 was the best peacetime year since 1921. A total of 83 vessels (steel, self-propelled, over 2000 gross tons) were completed last year for an aggregate of 933,787 deadweight tons. At present only 62 ships remain to be completed and when these are finished, the outlook for new contracts is not bright.

The rise and fall of shipbuilding before and after two wars is depicted in the accompanying table, showing annual ship production (over 2000 tons) since 1914.

During the peak year, 1943, shipbuilding took 11,433,000 tons of finished steel, or 19.1 per cent of the total produced. It likewise was the leading consumer in 1942, with 9,444,182 tons or 15.6 per cent, and in 1944, with 10,827,000 tons, or 17 per cent of the total. Steel consumption fell off to 2,719,415 tons, 4.7 per cent of the total, in 1945, and to less than one-half of 1 per cent in 1946.

Much of the work being done in shipyards today is on conversions or repair. Last year more than $100 million of conversion contracts were placed, on which $65 million remains to be spent. About $25 million in new contracts for conversions are expected to be placed this year.

The Postwar Planning Committee of the Maritime Commission has estimated that between 10 and 15 per cent of the wartime shipbuilding capacity may be expected to find permanent employment. Says the committee: "Statistically, it should be less but some of the older yards have survived tough times in the past and probably will be able to do it again."

While the outlook for builders of oceangoing vessels is bleak, a somewhat brighter picture confronts inland yards, building small craft, river boats and vessels for the Great Lakes.

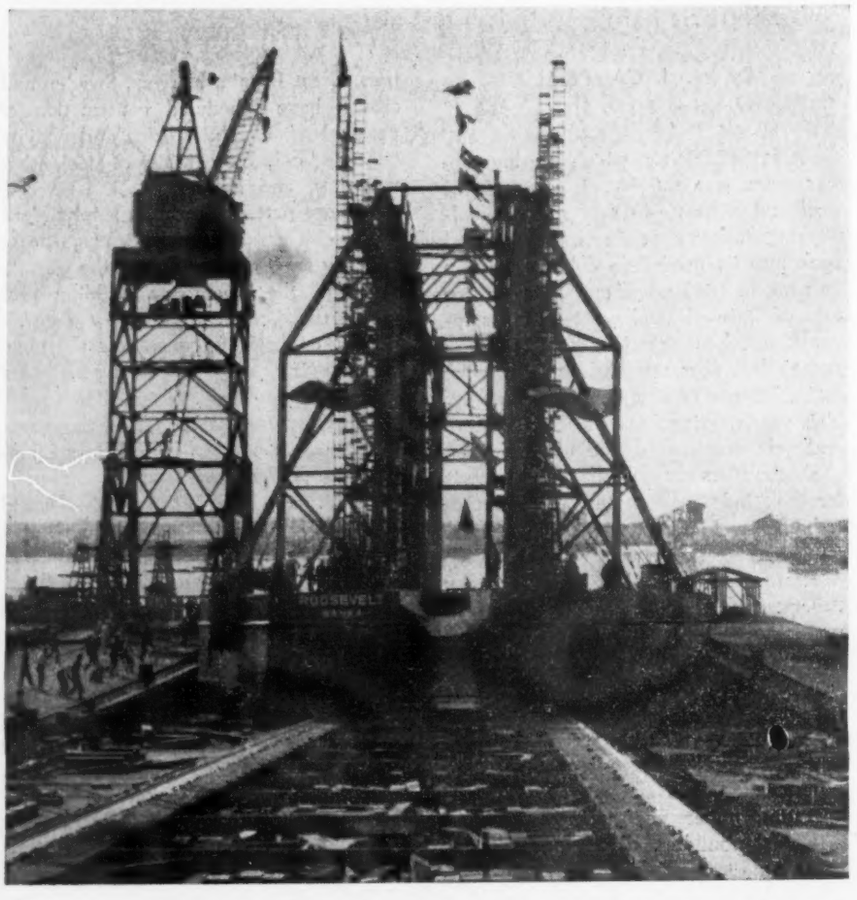
Small and pleasure boat builders are experiencing an active demand and their

SHIPBUILDING, 1914 TO 1946

(Steel, self-propelled vessels of 2000 tons or over).

Year	Number	Deadweight tonnage
1914	26	198,300
1915	24	173,850
1916	74	554,056
1917	125	951,167
1918	414	2,646,250
1919	723	5,085,684
1920	467	3,584,780
1921	183	1,886,851
1922	19	260,717
1923	18	159,940
1924	12	78,752
1925	12	103,670
1926	8	56,767
1927	19	181,511
1928	7	81,486
1929	8	84,180
1930	18	224,488
1931	14	154,941
1932	15	104,372
1933	4	32,367
1934	2	15,180
1935	2	29,760
1936	8	104,860
1937	15	191,929
1938	24	284,082
1939	28	342,033
1940	53	634,234
1941	95	1,088,497
1942	724	7,906,360
1943	1,661	18,521,534
1944	1,463	16,143,065
1945	1,041	10,304,644
1946	83	933,787

Huge tin dredge ROOSEVELT, built for the Billiton Co., The Hague, Holland, slides down the ways at the Tampa (Fla.) Shipbuilding Co. It will be used to dredge tin in the Netherlands East Indies. Press Association photo



chief worries at present are obtaining of materials. Public interest in small craft was indicated by an overflow attendance at the National Motor Boat show in New York in January. Nearly four times as many attended the show as in the last previous exposition in 1941.

The bulk freighter fleet on the Great Lakes is due for a number of replacements. A number of large new freighters are reported to be in the blueprint stage, although it is believed unlikely that any will be built in 1947, at least in the early part of the season.

Lake shipping authorities point out that retirement of some of the older and smaller units is only a matter of time. Operating expenses, especially wages, have increased so sharply that operation of the smaller freighters is hardly feasible and it is believed they will be withdrawn and replaced with new super freighters when steel and labor become more available and when the cost picture becomes more settled.

Several projects involving conversion of war-built ocean vessels for the Great Lakes passenger and cruise trade are active, although this business is being seriously handicapped by increased operating costs resulting from higher wages and work-week restrictions.

Freight Car Steel Program Details Being Worked Out

Freight car builders, meeting with CPA last week, were instructed to start placing orders for steel and report back to CPA on amounts of steel ordered and promise dates of delivery. They were advised they can expect 165,000 tons of steel monthly, possibly as a minimum figure. Twenty-two steel companies have entered the car program so far, and others may join shortly.

The program has not reached the scheduling stage, but the meeting last week was advised of the following details of the steel to be furnished: Bars 23,874 tons per month; shapes 36,971 tons; plates 62,618 tons; sheets 21,785 tons; billets 2735 tons; pipe 3650 tons; axles 12,586 tons. Of the total tonnage, 102,000 will be earmarked for new cars and 63,000 for repairs and operation.

Find New Motor Standards Give Service Improvements

Standardization of small electrical motors as a result of recommendations adopted by the National Electrical Manufacturers Association will improve servicing and performance of refrigerators, pumps and similar appliances, members of the American Institute of Electrical Engineers were told at their recent winter meeting in New York.

Government Stockpiling of Essential War Materials To Be Accelerated by Army-Navy

GREATLY accelerated program for stockpiling essential war materials is planned by the Army and Navy, it was revealed last week in a special report which indicated that during the current 1947 fiscal year the Army & Navy Munitions Board believes it should purchase $140 million of raw materials. This would involve additional purchases during the remainder of the year exceeding $100 million.

In the 1948 fiscal year beginning July 1, 1947, the board plans to purchase $360 million of materials. Remaining 1947 purchases will include large quantities transferred from the war surpluses of the various government agencies. Most of the 1948 contracts, however, will be with private companies.

The data were provided originally in a confidential report submitted by the secretaries of War and Navy to the speaker of the House and the presiding officer of the Senate. The report was returned so that the confidential figures on the stocks of materials now on hand and the exact amounts to be purchased could be deleted and the report was returned to Congress last week.

It shows that the Munitions Board now believes the following materials should be purchased for stockpiling: Agar; antimony; asbestos; bauxite; beryl; bismuth; cadmium; castor oil; celestite; chromite; cobalt; coconut oil; columbite; copper; cordage fibers; manila and sisal; corundum; industrial diamonds; emetine; graphite; hyosine; iodine; jewel bearings; kyanite; lead; manganese ore; mercury; mica; monazite; nickel; opium; palm oil; pepper; platinum; iridium; pyrethrum; quartz crystals; quebracho; quinine; rape seed oil; natural rubber; rutile; sapphires; rubies; shellac; sperm oil; talc; tantalite; tin; tung oil; tungsten; vanadium; zinc; zircon.

So far the Board through the Treasury Department's Procurement Division has spent $34,937,292 for stockpiling. It has $65,062,707 available for additional purchases. The report said purchases were made slowly to keep stockpiles in balance with one another and to give civilian industries first call on scarce materials.

Present, Past and Pending

■ IRON ORE WAGE CONTRACTS EXTENDED TO MAY

ISHPEMING, MICH.—The United Steelworkers of America (CIO) last week extended contracts with two major iron ore firms on the Marquette Range from Feb. 15 to May 15. Agreement was with the Inland Steel Co. and the North Range Mining Co. Similar agreement is expected to be worked out with other ore mining companies thus eliminating immediate threat of a strike on the ore ranges.

■ FRUEHAUF TO ACQUIRE CARTER MFG. CO.

DETROIT—Agreement to acquire all outstanding stock of Carter Mfg. Co. and Carter Inc., Memphis, Tenn., was announced last week by Harvey C. Fruehauf, president, Fruehauf Trailer Co. Carter trailers will continue to be manufactured at Memphis.

■ ADMIRAL BEN MOREELL HEADS JONES & LAUGHLIN

PITTSBURGH—Admiral Ben Moreell last week was elected chairman of the board, chairman, executive committee, and president, Jones & Laughlin Steel Corp. to succeed H. E. Lewis who is retiring because of his health.

■ GENEVA WORKS BLAST FURNACE OPERATIONS FULL

PROVO, UTAH—The third of the three blast furnaces at the Geneva Steel Works of the United States Steel Corp. has been blown in, bringing blast furnace operations at the plant to 100 per cent for the first time since the end of the war.

■ NASH TO BUILD TRUCKS AT KENOSHA PLANT

KENOSHA, WIS.—Full scale entry into the manufacture of trucks at the Nash Motors Division here is reported planned by Nash-Kelvinator Corp. The truck assembly line will be housed in the wartime aircraft engine and parts plant which the company operated during the war and recently purchased from the WAA for $1,033,000.

Await Further Portal Pay Clarification

Congressional and Supreme Court action necessary to define industry's obligations. Dismissal of claims in "original" Mt. Clemens Pottery Co. case seen as only first step

CLARIFICATION of the portal pay issue through amendment of the Fair Labor Standards Act or other action by Congress and through interpretation of the act by the Supreme Court is just as necessary now as it was before Federal Judge Frank A. Picard dismissed the suit of the Mt. Clemens Pottery Co. workers Feb. 8.

This is the opinion of many industrialists whose companies are threatened by portal pay suits aggregating almost $5 billion. Actually, they point out the ruling in the Mt. Clemens case affects only that case and does little to resolve the "horrible mess," as one of the CIO's own attorneys puts it, stirred up by the union's strategy. These spokesmen warn against a false feeling of security based on Judge Picard's decision, even though the ruling is viewed as the first step in clarifying the case.

Judge Picard dismissed in their entirety the claims of the Mt. Clemens workers for walking time and make-ready-for-work pay under *de minimis* rule, saying that the claims were too trifling to consider.

He ruled, however, that this should not be understood as holding that all portal suits should be dismissed since there may be "many instances where walking and the preliminary activities time consumed is of such amount as to call for compensation that the workers are not now receiving." The judge made a sharp distinction between manufacturing and coal mining and indicated his ruling should "apply to industry in general."

Judge Picard contended that even should the Supreme Court overrule him on the issue, awards for pay claims should not be made retroactive beyond June 10, 1946, the date of the original ruling by the Supreme Court in the Mt. Clemens case. Many of the portal suits now pending are asking pay retroactive to 1939.

CIO spokesmen indicated the case will be appealed to the Supreme Court, a move welcomed by industry which is just as anxious to obtain a final ruling in the case. CIO spokesmen also said they would continue to push other portal pay suits and that each of these would stand on its own merits. They admitted that considerable weeding out of claims would be necessary. Last week a number of portal pay suits were withdrawn and observers believed more would be dropped preliminary to negotiation of new wage contracts.

Judge Frank A. Picard is shown giving newsmen his decision dismissing the portal pay claims of the Mt. Clemens Pottery Co. workers. NEA photo

Popular interpretation of the Picard ruling is that the unions have been hoist by their own petard in their portal pay suit strategy. The fantastic claims made by the unions on industry gave added impetus to the demand for regulatory labor legislation and cost the unions heavily in popular support.

Following the Mt. Clemens case decision, Republican leaders in Congress agreed to give priority to consideration of measures for restricting portal pay suits. Bills to outlaw such suits and to limit the period of retroactivity are now before the judiciary committees of the Senate and House. Sen. Alexander Wiley (Rep., Wis.), chairman of the Senate Judiciary Committee, said these measures would be made the first order of business and that he expected to be able to report on a portal pay bill this week.

Industry Apprehensive of Coal Strike; Operators Repudiate Welfare Fund Levy

METALWORKING management, with its production machinery running in high gear and comparatively free from work stoppages, is keeping an anxious eye on developments in the soft coal industry. This is agreed to be the hottest potential trouble spot in all industry and two distinct threats of mine walkouts are foreseen.

Most immediate threat may materialize Apr. 1 if John L. Lewis wins a decision over the government in the injunction case now pending before the Supreme Court. Should the tribunal's decision favor Lewis, it is possible he will call a new strike Apr. 1.

The second threat lies in a strike at midyear when the government will have to turn the coal mines back to the private operators, from whom they were seized last May. The government has been allowing the United Mine Workers to assess a royalty of 5 cents a ton on all coal mined for a miners' welfare fund.

Last week the operators served notice they will not agree to continuance of the royalty after the mines are returned to them. This, they admitted, probably would result in a strike unless Congress takes remedial action before that time. They considered it unlikely that Lewis would back down in his demand for the royalty and the welfare fund, especially as the miners believe it to be a *fait accompli*.

Forney Johnston, counsel for the Na-

tional Coal Association, announced the operators' stand on the welfare levy after testifying before the House Labor Committee. He asked the committee to remove the protection of federal laws to all strikes over welfare funds, closed shops, or other "improper objects."

MEANWHILE, NEGOTIATIONS between United Steelworkers of America-CIO and leading steel producing companies continued in what were described by one industry spokesman as "skull practice" sessions. The question of the open shop, asked by the industry, and the union shop, asked by the CIO, is the principal item currently under discussion. Spokesmen for both sides report the sessions are attended by a spirit of "real collective bargaining."

For the next month, negotiations are expected to be devoted to non-economic issues, such as the union security demand, seniority, returning servicemen, and local working and bargaining conditions. The pay increase, guaranteed annual wage, premium pay for holidays, and portal-to-portal pay demands will be taken up later.

STEEL FABRICATORS have renewed their protests against union-wide bargaining. Spokesmen for these industries, which hold contracts with the United Steelworkers but which produce no steel, contend they should not be forced to "blindly follow" the Big Steel wage formula but that the union should bargain with individual companies in the light of local and competitive conditions.

Members of the industry have won considerable support for their position in testifying before the Senate Labor Committee. They pointed out that a year ago they were forced to grant the 18½ cent hourly increase recommended for the basic steel industry by President Truman and at the same time to pay increased prices for their basic raw material, steel, as result of the wage increase in the basic industry.

Texas Blast Furnace Bids Again Under Consideration

A resolution requesting President Truman to limit bidders for the various plants of the Lone Star Steel Corp. at Daingerfield, Tex., to East Texas firms was approved unanimously by the Texas Senate recently.

War Assets Administration last week authorized a counter-proposal to the Lone Star Steel Co. for the purchase of the blast furnace and iron ore mines at Daingerfield, and three coking coal mines near McAlester, Okla. The company was given 15 days in which to accept or reject the proposal. The blast furnace has not been fully completed. Proposals received last Nov. 18 for purchase or lease were rejected by WAA.

Pacific and Gulf Port Bases No Longer Govern on Steel from East

Nearest eastern basing point, considering freight costs, now rules on shipments to West Coast except on products made in that area where local mills recently established base prices at or near points of production

PITTSBURGH

EASTERN steel producers no longer are selling steel on Pacific Coast port and Gulf port basing points. Nearest eastern basing point, from standpoint of transportation costs, to West Coast destinations governs with the exception of steel products manufactured at West Coast mills on which producers recently established price bases at or near points of production.

Bethlehem Pacific Coast Steel Corp. has announced basing points and base prices of sizes, grades, finishes and specifications at each point of manufacture as follows: Hot-rolled carbon steel bars, $3.285 per 100 lbs at Seattle, San Francisco and Los Angeles; new billet concrete reinforcing bars, $2.985 at same bases; and tie plates produced at Seattle plant, $3.15 per 100 lbs fob mill.

Columbia Steel Co. has established basing points at San Francisco and Los Angeles on merchant and concrete bars of the types and sizes made at its Pittsburg and Torrance, Calif., plants, respectively. New delivered prices, which include switching charges, are: Merchant carbon bars, $3.33 per 100 lbs at San Francisco, $3.325, Los Angeles; reinforcing bars, $3.03 at San Francisco, and $3.025, Los Angeles. The spread in delivered prices at basing points on West Coast between merchant and reinforcing bars is 15 cents per 100 lbs more than in the East.

The company also established basing points and is quoting delivered prices at San Francisco on wire products, as follows: Bright basic manufacturers wire, $4.31 per 100 lbs; annealed merchant quality wire at $4.96, galvanized $5.41; annealed weaving wire at $8.33, galvanized $9.38; MB spring wire at $5.63; black premier spring wire $5.28; stand-

(*Please turn to Page* 152)

GOVERNMENT STEEL PLANTS NOT DECLARED SURPLUS

War Operator	Cost
INTEGRATED STEEL PLANTS	
Bethlehem Steel Co., Bethlehem, Pa.	$55,527,000
Carnegie-Illinois Steel Corp., Gary, Ind.	1,161,000
Carnegie-Illinois Steel Corp., Homestead, Pa.	6,590,510
Colorado Fuel & Iron Corp., Pueblo, Colo.	9,607,582
Crucible Steel Co. of America, Harrison, N. J. (6 plants)	723,000
	34,000
	1,187,000
	819,000
	13,573,000
	40,000
Jones & Laughlin Steel Corp., Aliquippa, Pa. (2 plants)	338,000
	2,848,073
Republic Steel Corp., Birmingham, Ala.	990,000
Fredericktown, Pa.	1,749,102
Birmingham, Ala.	2,415,842
Port Henry, N. Y.	11,728,673
Canton, O.	5,863,366
Beaver Falls, Pa.	119,221
Elkhorn, Ky.	1,241,731
Niles, O.	4,958,434
E. Hartford, Conn.	1,177,239
Brooklyn, N. Y.	2,013,910
Cleveland	523,140
Gary, Ind.	260,552
Massillon, O.	471,976
Chicago	317,151
Cleveland	1,057,169
Birmingham, Ala.	108,639
Massillon, O.	77,800
U. S. Steel Corp., S. Charleston, W. Va. (3 plants)	1,297,582
	3,095,900
	41,512,700
	$174,579,292
SEMI-INTEGRATED STEEL PLANTS	
American Locomotive Co., Latrobe, Pa.	$ 493,000
Chicago Heights, Ill.	229,000
Babcock & Wilcox Tube Co., Beaver Falls, Pa.	573,000
Lukens Steel Co., Coatesville, Pa. (2 plants)	2,639,000
	27,600,000
Pacific States Steel Co., Niles, Calif.	33,000
Rustless Iron & Steel Co., Baltimore	699,000
	$32,266,000
INDEPENDENT STEEL CASTING COMPANIES	
American Chain & Cable Co., Reading, Pa.	$ 845,000
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.	7,474,000
Bonney-Floyd Co., Columbus, O.	162,000
Falk Corp., Milwaukee	5,628,000
Pacific Car & Foundry Co., Renton, Wash.	1,243,000
Pennsylvania Electric Steel Co., Hamburg, Pa.	200,000
Sawbrook Steel Castings Co., Lockland, O.	303,200
West Michigan Steel Foundry Co., Muskegon, Mich.	671,000
Worthington Pump & Machinery Corp., Harrison, N. J.	766,000
	$17,292,200
INTEGRATED FORGING COMPANIES	
Baldwin Locomotive Co., Burham, Pa.	$ 147,000
Erie Forge & Steel Co., Erie, Pa.	12,734,000
Heppenstal-Eddystone Corp., Eddystone, Pa.	10,747,000
Isaacson Iron Works, Seattle	4,246,000
Mesta Machine Co., Pittsburgh	9,785,000
Midvale Co., Nicetown, Pa.	14,271,000
National Supply Co., Torrance, Cal.	2,129,000
	$53,759,000
NON-INTEGRATED FORGING COMPANIES	
American Forge Co., Berkeley, Calif.	$2,985,000
Camden Forge Co., Camden, N. J.	3,224,000
Chambersburg Engineering Co., Chambersburg, Pa.	540,000
Dickson Gun Plant, Houston, Tex.	19,080,000
Pennsylvania Forge Co., Philadelphia	2,962,000
Struthers-Wells Corp., Titusville, Pa.	2,821,000
	$31,612,000

New Flat-Rolled Steel Capacity Expected to Ease Supply Pinch

Market expert of American Rolling Mill Co. tells pressed metal group sheet and strip capacity of nation by yearend will total 19 million tons. When all new facilities contemplated are operating industry's capacity will top 1941 by 20 per cent

CONSUMERS' pressure for flat-rolled steel continues unabated and indications are a tight situation in this product will continue into 1948 despite adjustments in order books and anticipated increased output as new rolling facilities are brought into operation.

The extent to which producers will be able to catch up on accumulated demand for sheet and strip over coming months depends upon a number of factors. The labor situation, while improved, still presents uncertainties for the future. Materials shortages persist, currently scrap supply being critical. Acquisition of certain sheet mills by consuming interests over the past year, to considerable extent, removed these plants as sources of supply for the open market and served to disturb distribution from normal pattern. Further, some antiquated rolling equipment can be expected to go out of service this year.

Future Holds Promise

Despite these adverse factors, however, the outlook is not without its encouraging points. Speaking recently before the New England District of the Pressed Metal Institute, on "Future Markets for Pressed Metal," D. H. Malcolm, manager, Marketing Service Department, American Rolling Mill Co., Middletown, O., emphasized this, pointing out that while we will be faced with steel shortages for months to come, at least we are in sight of greater supplies.

"Currently the steel sheet and strip industry is producing at the rate of 16.8 million tons and the supply lines are gradually filling to a normal operating level," he said. "Above all, new capacity in considerable quantities is expected in the last half of this year. At present the steel industry has about three million tons of sheet and strip producing capacity on order for this year and more is contemplated for 1948. When these new facilities are in operation they will raise the production capacity of the steel sheet and strip industry nearly 20 per cent above 1941 levels."

Discussing capacity and production, Mr. Malcolm said estimated capacity by the end of 1947 will consist of 9.9 million tons of hot-rolled sheet and strip, 7.5 million tons of cold-rolled sheet and strip, and 1.6 million tons of galvanized sheets, making a total of 19 million tons. For comparison, he said 1946 estimated output was: 7.4 million tons of hot-rolled sheet and strip, 5.3 million tons of cold-rolled sheet and strip, and 1.4 million tons of galvanized sheets, making a total of 14.1 million tons. In 1941, production was 10.2 million tons of hot-rolled sheet and strip, 4.3 million tons of cold-rolled sheet and strip, and 1.6 million tons of galvanized sheets, making a total of 16.1 million tons.

Development of new products and redesigning of old ones in an effort to compete for sales when the sellers' market has passed hold promise that the pressed metal industry soon will experience its greatest sales opportunity, according to Mr. Malcolm. He feels several factors combine to make the industry's future bright. During the past 20 years there has been a gradual change, he pointed out, in product design, many manufacturers switching from old materials to stampings.

Technically the pressed metal industry has strengthened its competitive position by improving production equipment and methods during the war and consequently has enhanced its ability to offer stampings that help designers achieve desired end-products, either newly designed or redesigned.

Mr. Malcolm said, "most economists feel that we can expect heavy demand for durable goods for the next six months. However, they feel that the latter part of 1947 may mark the turning point of this demand.

"But regardless of conditions, as production reaches normal and supply lines fill, manufacturers will be faced with return of competitive marketing problems. Already, alert manufacturers are realizing this. They are employing every force available to show the quality and sales appeal of their product and to counteract public opinion that postwar products are substandard in quality."

Of prime importance to the pressed metal industry, Mr. Malcolm pointed out, "is that manufacturers are now reaching back on the shelf, dusting off postwar product plans, and giving them the final design touches in view of present knowledge about public desires, materials, and manufacturing methods.

In suggesting what individual companies in the stamping industry can do in an effort to get the largest possible share of the most profitable business, Mr. Malcolm classified his suggestions under lower cost production, better quality products, and better merchandising of products, services and facilities.

Postwar Products Aren't Pushed

"Many materials developed during the war will be available soon," he said. "In fact, many are already on the market but the chances are manufacturers are not pushing them because they can't take care of new customers." He cited, in this connection, aluminized steel, a steel coated on both sides with aluminum which has met favor in many applications but which the producers are not aggressively offering on the market because it already is sold out on the product. He also pointed to stainless steel and the expanding applications of this metal in many lines of consumption.

"A stamping company which makes no finished products may ask why it should know about these new materials and make advanced plans when it produces products only on specification," Mr. Malcolm said. "That brings us to the part of the competitive operation in which most stamping plants could stand the greatest improvement; that is, the merchandising of facilities and products.

"The future leaders of the pressed metal industry will be those who sell instead of simply fill orders. To accomplish this, salesmen must be product engineers instead of order takers. When salesmen begin to see themselves as product engineers they will realize the advantage of knowing more about the

WHAT TO CONSIDER

There are many factors to be considered in working out a complete merchandising plan but the key thoughts that should be remembered are: 1—The period of scarcity will soon be over and we must be ready to sell our products in a competitive market. 2—The question will not be "can we produce all we can sell" but rather "can we sell all we produce". 3—Our individual future will depend on how well we are equipped to meet competition when it comes and this in turn depends on what action we take between now and that time.—*D. H. Malcolm, manager, Marketing Service Department, American Rolling Mill Co.*

different types of materials that can be used in helping customers improve serviceability and salability of their end-products.

Portsmouth Steel Plans To Enlarge Its Facilities

First six months of operations of Portsmouth Steel Corp., Portsmouth, O., resulted in net income of $1,160,879. The company began operations on July 1, 1946, after purchase of the Portsmouth Works of Wheeling Steel Corp., Wheeling, W. Va. Net sales for the period were $16,886,815.

Commenting on sales, E. A. Schwartz, president, revealed Portsmouth has entered into several long-term arrangements for sale of a number of its products. He expects production and sales to be at record levels in 1947. The company has unfilled orders that take up its rated capacity for 1947, and in addition has orders into 1948 and 1949.

Fence-making capacity will be increased by additional high-speed machinery which soon will be in operation. Wire galvanizing capacity is being increased and installation of equipment to make fine drawn wire and wire specialties is being started.

In the last quarter of 1946, new production records were achieved in the company's coke oven, open hearth, blooming mill, wire drawing and nail mill departments. Average steel production was increased from 50,735 net tons a month in the third quarter of 1946 to 53,976 net tons a month in the final quarter of the year, with an all-time high for the Portsmouth Works of 56,120 net tons in December.

Reserve Mining Reported Planning Taconite Plants

Construction of two taconite concentrating plants on the Mesabi range and the north shore of Lake Superior is reported in press dispatches as planned by the Reserve Mining Co., which is managed by Oglebay, Norton & Co., Cleveland.

It is reported from Duluth that the plants to process the low grade iron ore will be built at Babbitt, Minn., and near Beaver Bay, on Lake Superior.

Recent announcements (STEEL, Jan. 27, p. 43, and Feb. 10, p. 82) of plans for concentration of taconite in the region by Oliver Iron Mining Co., subsidiary of United States Steel Corp., and the Erie Mining Co., affiliate of Pickands, Mather & Co., Cleveland, indicate the trend toward large-scale experimental projects for utilization of marginal and taconite ores to increase and conserve the country's iron ore resources.

Steelmaking Capacity Cut Less Than 1 Per Cent During 1946

American Iron & Steel Institute reports capacity for steel ingots and steel for castings at 91,241,250 net tons on Jan. 1, decline of 659,310 tons. Blast furnace capacity down 1,631,390 tons from year ago

TOTAL capacity for production of steel ingots and steel for castings in the United States on Jan. 1, 1947, was 91,241,250 net tons, compared with 91,890,560 a year earlier, the American Iron & Steel Institute reported last week. The decline was less than 1 per cent.

Open hearth capacity on Jan. 1, 1947, was lowered to 81,010,990 net tons from 81,236,250 on Jan. 1, 1946, while electric furnace capacity was reduced to 5,076,240 net tons from 5,500,290. Bessemer furnace capacity remained unchanged from the year-earlier total of 5,154,000 net tons. Crucible capacity remained at 20 net tons.

Blast furnace capacity was reduced to a total of 65,709,200 net tons of pig iron and ferroalloys as of Jan. 1, 1947, against 67,340,590 net tons on Jan. 1, 1946. The capacity of coke pig iron furnaces was lowered from 66,311,410 tons to 64,674,020 tons, with a small portion of this change reflecting an increase in ferroalloy capacity to 1,002,700 net tons on Jan. 1, 1947, from 996,700 net tons a year earlier. The capacity of charcoal pig iron remained at 32,480 net tons.

CPA Committee Approves Steel Plant Expansion

Expansion of the Crucible Steel Co. of America plant at Midland, Pa., to cost $1,714,180, is among non-housing projects just approved by the Facilities Review Committee, Civilian Production Administration.

January Ingot Output Sets Peacetime Record

January steel production established a peacetime record, totaling 7,234,187 net tons of ingots and steel for castings, and representing an average operating rate of 93.3 per cent of capacity. January output was the highest for any month since May, 1945, according to an announcement by the American Iron & Steel Institute.

If the January rate of operations were maintained throughout the year, total 1947 steel production would top 85 million tons, which would be 28 per cent greater than last year's production.

STEEL INGOT PRODUCTION STATISTICS

Based on reports by companies which in 1945 made 97.6% of the open hearth, 100% of the bessemer and 85.8% of the electric ingot and steel for castings production

	Estimated Production—All Companies								Calculated weekly production all companies	Number of weeks
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
1947	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	In mo.
Jan.	6,560,118	95.3	384,213	87.7	289,856	67.2	7,234,187	93.3	1,632,999	4.43
1946										
Jan.	3,528,090	51.1	207,512	47.4	136,452	29.2	3,872,054	49.6	874,053	4.43
Feb.	1,300,944	20.9	25,905	6.6	65,668	15.6	1,392,517	19.8	348,129	4.00
March ..	5,946,698	86.2	363,949	83.1	196,400	42.0	6,507,047	83.3	1,468,859	4.43
1st qtr..	10,775,732	53.8	597,366	47.0	398,520	29.4	11,771,618	51.9	915,367	12.86
Apr.	5,333,139	79.8	286,088	67.5	241,031	53.3	5,860,258	77.5	1,366,028	4.29
May	3,699,979	53.6	153,409	35.0	219,064	46.9	4,072,452	52.2	919,289	4.43
June ...	5,145,594	77.0	251,253	59.2	227,979	50.4	5,624,826	74.4	1,311,148	4.29
2nd qtr..	14,178,712	69.9	690,750	53.7	688,074	50.1	15,557,536	67.9	1,195,814	13.01
1st 6 mos.	24,954,444	61.9	1,288,116	50.4	1,086,594	39.8	27,329,154	59.9	1,056,403	25.87
July	6,016,253	87.4	365,332	83.6	228,083	48.9	6,609,668	84.9	1,495,400	4.42
Aug. ...	6,251,271	90.6	373,837	85.4	261,755	56.0	6,886,863	88.2	1,554,597	4.43
Sept. ...	5,911,375	88.6	371,465	87.8	235,054	52.1	6,517,894	86.4	1,522,872	4.28
3rd qtr. .	18,178,899	88.9	1,110,634	85.6	724,892	52.3	20,014,425	86.5	1,524,328	13.13
9 mos. ..	43,133,343	71.0	2,398,750	62.2	1,811,486	44.0	47,343,579	68.9	1,213,938	39.00
Oct.	6,268,102	90.8	387,933	88.6	253,562	54.3	6,909,597	88.5	1,559,728	4.43
Nov. ...	5,822,670	87.1	318,350	75.1	268,655	59.4	6,409,675	84.8	1,494,097	4.29
*Dec. ..	5,231,359	76.0	222,782	51.0	246,856	52.9	5,700,997	73.2	1,289,818	4.42
*4th qtr..	17,322,131	84.6	929,065	71.5	769,073	55.5	19,020,269	82.1	1,447,509	13.14
*2d 6 mos.	35,501,030	86.7	2,039,699	78.5	1,493,965	53.9	39,034,694	84.3	1,485,904	26.27
*Total ..	60,455,474	74.4	3,327,815	64.6	2,580,559	46.9	66,363,848	72.2	1,272,801	52.14

*Preliminary figures.

For 1946 percentages are calculated on weekly capacities of 1,558,041 net tons open hearth, 98,849 net tons bessemer and 105,491 net tons electric ingots and steel for castings, total 1,762,381 net tons; based on annual capacities as of Jan. 1, 1946, as follows: Open hearth 81,236,250 net tons, bessemer 5,154,000 net tons, electric 5,500,290 net tons, total 91,890,540 net tons.

WAA Definitions Clarify Tool Pricing Policy

Terminology used in describing tools and machinery offered as surplus promulgated by government disposal agency

TO CLARIFY its new fixed price policy for commercially salable new and used standard general-purpose machine tools and machines, the War Assets Administration has promulgated a list of pertinent definitions.

"Commercially unsalable machinery" means "machinery (1) which by reason of its condition resulting from damage, wear, obsolescence, or otherwise has no reasonable prospect of sale except as scrap or salvage or (2) with respect to which the estimated cost of care and handling and disposal will exceed the estimated proceeds unless it is promptly sold as scrap or salvage."

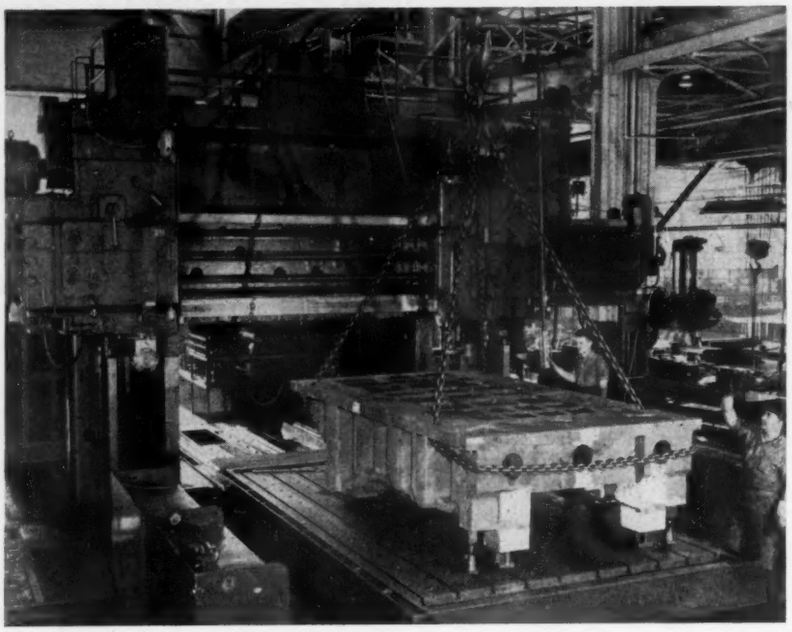
"Salvage" means "property that is in such a worn, damaged, deteriorated or incomplete condition, or is of such a specialized nature that it has no reasonable prospect of sale as a unit, or is not usable as a unit without major repairs or alteration. Salvage has some value in excess of its basic material content because it may contain serviceable components or may have value to a purchaser who may make major repairs or alterations. Salvage includes used containers and cable reels."

"Scrap" means "property that has no reasonable prospect of sale except for its basic material content."

"Standard general purpose machinery" includes new and used machine tools and machines (with the exception of special machinery) listed in the Directory of Metalworking Machinery Classification, 1945, in the Standard Commodity Classification for May, 1943, Vol. I, and in a long list prepared by the WAA from its inventory holdings.

"Special machinery" includes: "1—Special gun reaming, rifling and chambering machines; 2—gun boring and turning lathes; 3—shell turning lathes; 4—shell tappers; 5—small arms ammunition machines; 6—special military tank manufacturing machines; 7—special military aircraft manufacturing machines; 8—special shipbuilding machines; 9—other machines which may later on be added as 'special machinery'."

"Attachments and tooling" means "those accessories to a basic machine which, when applied to the basic machine, render possible an additional operation or process or the functions for which the machine was intended. It includes but is not limited to vertical heads, gear cutting accessories, index heads, feeding accessories, tapering equipment, chucks, jigs, fixtures, gages, molds, tool holders, followers, etc."



HEAVY STUFF: This 185-ton two-head milling machine is now in operation in the die and machine plant of the Fisher Body Division of General Motors. Specially built for Fisher, the machine has a 38 ft bed, and 18 ft table and operates with 178 hp. Five railroad flat cars were required to transport it to Detroit

Tool Sales Pattern Holding Unchanged at Cincinnati

Cincinnati — Machine tool sales continue to follow the pattern of recent weeks, with tool builders putting emphasis on the investment value of the newer, more productive types. Foreign contracts, perhaps one-fourth of the totals, have shifted from nations facing financing problems, to Russia, Turkey, and Czechoslovakia.

WAA Offers Two Giant Metal Stamping Presses

Two giant metal stamping presses are being offered for sale by the Cleveland regional office of the War Assets Administration. Both are located at the former Fisher Bomber Plant at Cleveland Airport.

Originally used in producing B-29 bomber and P-75 pursuit aircraft fuselage panels, these Bliss Hydro-Dynamic presses, one of 5000 tons capacity and the other of 2500 tons capacity, may be adapted to the stamping of railway cars, bath tubs, stoves, auto bodies, aircraft sections, and to the manufacture of metal doors and panels.

Standing 30 feet high and weighing 872,000 pounds, the 5000-ton capacity press was purchased by the government for $168,356 and is for sale for $90,240 fully equipped with all necessary controls and safeguards. All motors operate on a 3-phase, 60-cycle, 440-volt power supply. The 2500-ton press stands 24½ feet high, originally cost $101,361 and may be purchased for $48,247.

Cleveland Automatic Moves Plant To Cincinnati

The Cleveland Automatic Machine Co., after more than half a century operation at the scene of its start in Cleveland, has been moved to new headquarters in Cincinnati, where its permanent address will be 4932 Beech Street. Business and sales offices were moved early in January and moving of plant equipment and personnel is expected to be completed by early March.

This marks the completion of a change started in 1944 when control of the company was purchased by the LeBlonds of Cincinnati. Harold R. LeBlond became president of Cleveland Automatic at that time.

The company name will continue to be the Cleveland Automatic Machine Co., and it will be operated independently of the other LeBlond companies.

Trend Toward Automatic Heating May Break Stoker Output Record

Production in 1947 may exceed 1941 all-time high of 200,000 units. Demand aided by short supply of oil and gas burners and scarcity of gas in some areas. Greatest demand for stokers comes from old homes where coal furnaces are being modernized

By VANCE BELL
Associate Editor, STEEL

TREND toward automatic heating for homes may push coal stoker production to a new high in 1947 despite the strides automatic gas and oil heating have made in winning buyer acceptance in recent years.

To reach a new high, the 1941 stoker sales record of nearly 200,000 would have to be exceeded, but Walter Sormane, president, Stoker Manufacturers' Association, Chicago, expects 1947 sales to exceed the 1941 total if coal production is uninterrupted and further appreciable price increases are avoided.

Despite the coal strikes, which adversely influenced consumer selection of solid fuel for heating, and despite difficulties of procuring materials and components, 1946 stoker production topped an estimated 195,000 units.

Stoker demand is aided by the fact the supply of oil and gas burners is short, as is the gas supply in various regions. Many heating plants which were destined to be converted to oil or gas are still burning coal, and in some areas, gas companies have prohibited connecting of additional central heating plants to their service lines until gas distribution systems can be enlarged or the supply boosted.

There are approximately 75 stoker manufacturers in the United States. Competition is keen among these manufacturers but competition offered by automatic gas and oil burners is the major concern of the industry. In the first 11 months of 1946, shipments of warm air gas furnaces totaled 196,739 and warm air oil furnaces 62,102, making a combined total of 258,841 automatic furnaces. And that figure does not include thousands of gas or oil conversion burners sold to change manually-fired coal furnaces into automatic systems. In contrast, stoker sales in those first 11 months aggregated 180,281 units, of which 9088 were for medium-size heating jobs and industrial applications, and 171,193 for residential uses and small commercial heating jobs.

Stoker salesmen realize the wartime sellers' market is over and have adopted aggressive selling methods in competing against oil and gas heating. Stoker manufacturers claim coal provides more comfortable heating and has advantages not possible with automatic heating. Even though coal prices have risen, coal, fired with a stoker, they claim, is cheaper than other fuels. However, in installations of new automatic central heating plants for homes, preference has been shown gas and oil units, approximately 75 per cent of stoker installations having been in homes where manually-controlled coal furnaces are being modernized and made automatic.

Despite inroads by gas and oil heating there are places where it is not practical to heat with those fuels, and so those areas remain potentially good sales territories for the automatic coal stoker industry.

Reflecting the hopeful outlook for stoker sales is the entrance into stoker manufacturing field by a firm whose years of successful business attest to the exercise of sound judgment. That newcomer is the A. O. Smith Corp., Milwaukee, whose total assets last July 31 were in excess of $48 million.

Figures of the U. S. Bureau of the Census show that while factory sales of mechanical stokers for homes in the first 11 months of 1946 were double those for the corresponding period of 1945 there was a decline in sales of the larger, industrial type. This pattern, one stoker manufacturer explains, was the result of the war period when stoker builders had to concentrate efforts on industrial equipment, the demand for home-size stokers accumulating meanwhile.

Increasing production of home stokers is catching up with accumulated orders, and most stoker makers now can fill new orders without delay. Recently, the Iron Fireman Mfg. Co., Portland, Oreg., advised its dealers that this year they will be able to obtain all the domestic, commercial and industrial stokers they can handle.

Productionwise, the stoker industry should not have much difficulty in 1947 to make all the units it can sell, Mr. Sormane says. Fractional horsepower electric motors, vital components of stokers, appear to be the item most difficult to procure. However, that situation is expected to ease in the next six or seven months. Also in tight supply, but less so than motors, are castings and light-gage sheet steel. Easier in supply than the latter two is steel plate.

If the stoker industry's 1947 production equals the 1941 record of nearly 200,000 units, iron and steel requirements would be 45,000 to 50,000 tons.

The Pocahontas Fuel Co. Inc., whose Stoker Division is located at Cleveland, reports that because of unbalanced supplies of materials it is operating at only 60 per cent of capacity. Worker productivity is higher than during the war, although it is pointed out that most of the company's employees are old in the point of service and well experienced. With operations at 60 per cent of capacity it has not been necessary to employ many new people.

MEETING THE CHALLENGE

Gains by gas and oil heating in winning consumer acceptance, has spurred stoker manufacturers to improve their units. Development programs are being pushed to make stokers as labor-free, as dependable, and as economical as possible. An example of this research is one company's stoker which not only carries coal from the bin to the furnace but also removes the ashes from the furnace to a dust-tight container and packs them in so that the can need be emptied only at 10-day intervals. This company's stoker moves coal around corners, making it possible to install the stoker regardless of the position of the coal bin in relation to the furnace.

Latest model stokers are so refined one company tops its sales arguments by proclaiming its model makes for such clean heating equipment that it is offered in snow-white finish.

Sales of Household Washers In 1946 Break All Records

Factory sales of household washers in 1946 broke all records, totaling 2,023,981, according to the American Washer & Ironer Manufacturers' Association, Chicago. Total sales in 1941, last prewar year of full production, totaled 1,959,887 units. December washer sales aggregated 190,770, or 68 per cent above the 113,054 sold in December, 1941. Ironer sales for the year were 124,616, compared to 215,994 in 1941. December sales topped the comparable 1941 month by 18 per cent, totaling 15,469.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Final step in 1947 reciprocal trade agreements program will be written at Geneva conferences. Threat by Republicans to sabotage program fades. U. S. delegation pledges it will demand as well as give concessions

NOW THAT the hearings of interested businessmen have been concluded, the next, and probably final, act in the reciprocal trade agreements program of 1947 will be staged at Geneva, Switzerland. There, starting Apr. 8, a United States government delegation will hold a series of conferences with representatives of 18 foreign nations. Proceedings will all be behind closed doors and the next significant announcement to be made public will set forth the details of the treaties after they have been signed, sealed and delivered.

The assumption that the proceedings at Geneva probably will be final appears warranted by the recent trend in Congress. Republicans who wanted to sabotage the reciprocal trade treaty program apparently are a small minority. Unless the treaties to be negotiated in Geneva turn out to be widely unpopular, it is unlikely Congress will take any action to nullify the program.

Preparations for the Geneva conferences are in the hands of a Trade Agreements Committee named by the boss of the show, Undersecretary of State William L. Clayton. The committee includes: Chairman, Winthrop G. Brown, State Department; Harold H. Neff, War Department; Leslie A. Wheeler, Agriculture Department; Harold Glasser, Treasury Department; Capt. Wakeman B. Thorp, Navy Department; John W. Evans, Commerce Department; and Oscar B. Ryder, United States Tariff Commission.

Assisted by several hundred employees of the various departments interested, the committee is assembling all the recommendations received from American businessmen, both in the oral hearings and in their written briefs. They will be worked into a report to President Truman in which Mr. Clayton will discuss in detail the objectives which he hopes to reach at Geneva. Then will come the Presidential directive authorizing negotiations at Geneva along the lines of the Clayton agenda.

Only government men will go to Geneva; there will be no businessmen to serve in a consulting capacity. Though this decision will prove widely disappointing, Chairman Brown of the Trade Agreements Committee says it could not be avoided. The committee gave careful thought to suggestions that it take American businessmen along to help engineer solutions to the many knotty problems that are expected to arise in the course of the "horse-trading" sessions.

First, it was unable to devise a formula for selecting representatives of the various businesses and industries who could be regarded as acceptable on all counts. Second, it would have had to take a large delegation along—and housing accommodations at Geneva are limited. Third, it feared a large delegation would serve to complicate the discussions and delay action.

What is the general attitude of the committee in looking forward to the Geneva conference? Does the committee expect to use the Geneva trade agreements conference as a means of stimulating international amity at the expense of the United States? The answer to this latter question appears to be: "No."

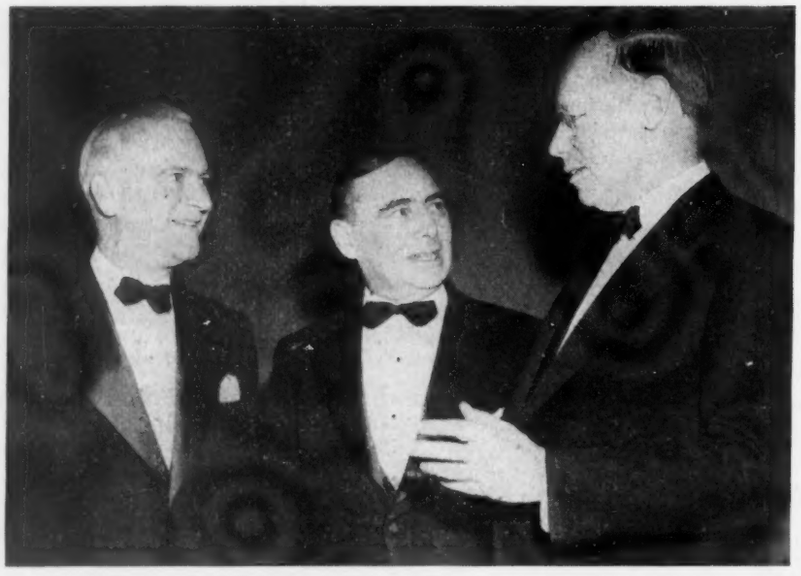
"No matter what we accomplish at Geneva, we probably will not come back with treaties that will suit every American," a committee member told STEEL. "But we are going over there to 'take' as well as 'give.' We know what American industry wants, and in general we should be able to obtain satisfactory concessions in exchange for those we give. We will probably not get everything we demand, and we probably will have to refuse many demands by the other countries. But we will not negotiate treaties that will leave the United States holding the bag for the rest of the world."

Big Variety of Products Covered

Recommendations expressed in the written briefs and the oral statements involved thousands of different products of importance to the American economy. They differed widely to fit the peculiar conditions affecting each product. Hence any attempt to draw a general conclusion as to the nature of the specific recommendations would be dangerous.

It was noticeable throughout the public hearings, however, that requests for increased protection were the exception rather than the rule. Time and again the representatives of key industries stated flatly that they do not need added protection in the form of increased tariffs. Many of them, in fact, declared that they would not oppose reductions in tariffs on products they manufacture.

Majority of the spokesmen at the hearings were interested primarily in lowering the barriers which many foreign countries use to keep out American goods. Strangely enough, there was relatively little complaint over the 100 per cent state trading policy of the USSR. The



PLEDGE CORPORATE TAX RELIEF: Speaker of the House Joe Martin, center, pledged the Republican party to give tax relief to corporations as well as individuals when the new Congress cuts the costs of government operations. Shown with Mr. Martin are Gov. Dwight H. Green of Illinois, left, and Sen. Robert A. Taft of Ohio. NEA photo

THE HOLE STORY . . . *fast*

The new No. 212 Bryant Automatic Internal Grinder *roughs* and *trues* and *finishes* and *stops* automatically. It requires a minimum of operator attention. It has 9″ maximum swing — 3″ grinding traverse — 12″ total wheel traverse.

The wheelhead shown is the Bryant Hi-Frequency direct drive motor built to operate at speeds up to 100,000 R.P.M. The wheelhead is carried on a hardened and ground cylindrical slide.

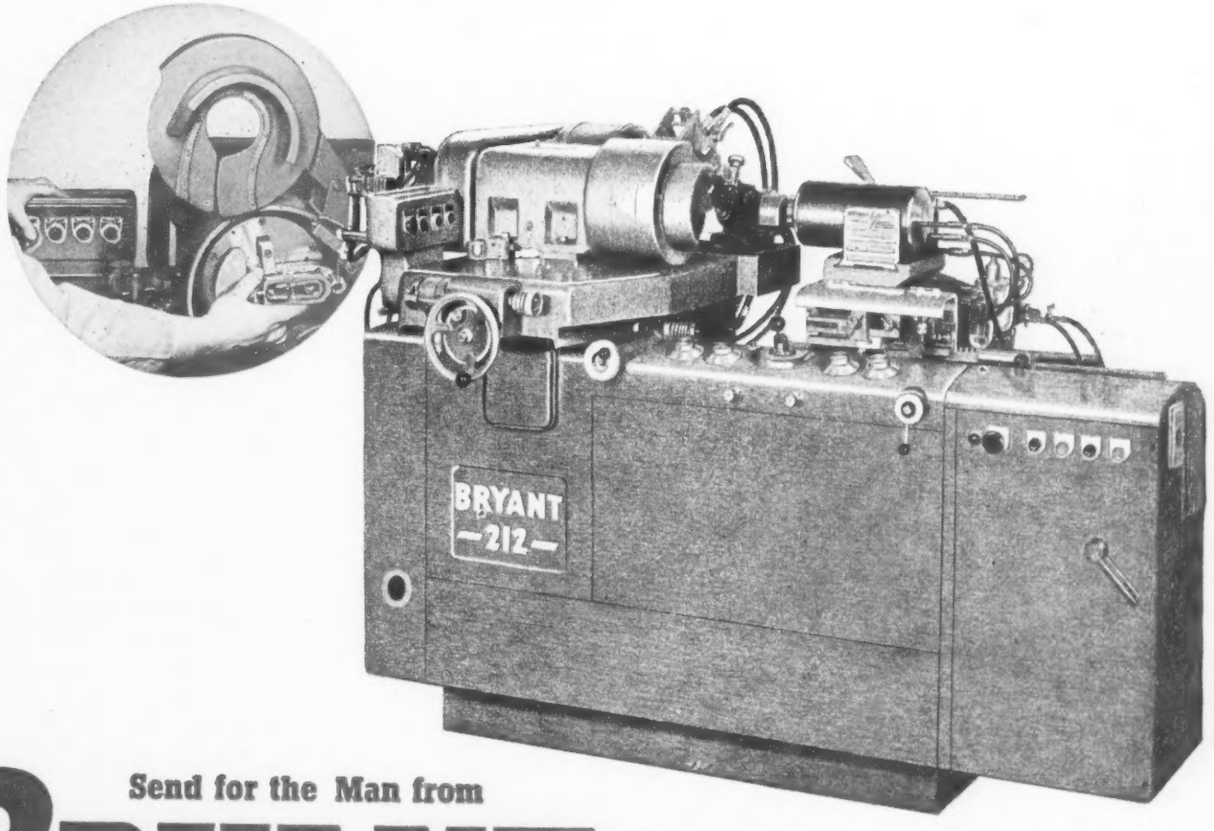
The cross-feed is in the work table which rides on anti-friction bearings and is controlled by a precision lead screw. The work spindle is mounted in preloaded ball bearings and is dynamically balanced to assure precision work.

An electrically controlled hydraulic system provides smooth operation and simple cycle change.

Automatic work sizing is accomplished by any of three methods: by a plug gage mounted in the work spindle; by a diamond contacting the bore; by the wheel trueing diamond.

Operator attention is further minimized by such features as convenient grouping of simplified controls and automatic pressure lubrication.

For a better product and a better profit, ask for further information on the Bryant No. 212 Automatic.



Send for the Man from

BRYANT

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

popular criticism was leveled at the difficulties placed in the path of our importers by the British Empire countries. If our delegation at Geneva carries on in accordance with the wishes of American businessmen, its big fight will be with the British.

A. S. Keller, Pratt & Whitney Division, Niles Bement-Pond Co., West Hartford, Conn., said there is no objection to the British duty of 20 per cent on machine tools. But there is strenuous American objection to the British differential tariff system "under which we must declare not simply a machine tool, but the motor equipment, the tooling, and special features on the machine. All have to be invoiced separately, and have to be boxed separately. This is a severe burden on the manufacturer and on the importer. A resulting bad thing is that the system encourages the importer to order our tools without the accessories that are necessary to get their full performance."

Mr. Keller urged an effort to get concessions from Australia. There we encounter a difficult situation in obtaining import and exchange licenses, and we are confronted with tariffs "that not only are high but highly discriminatory."

The barriers that apply in the case of Australia also apply to India, and Mr. Keller recommended that every attempt be made to open the Indian market to American machine tools. India, because of the trend toward industrialization in that country, should be a fine market for modern American machine tools, he said.

Criticizes Czechoslovakian System

He recommended an attempt to get Czechoslovakia to simplify her tariff system. Like the British, the Czechoslovakians have a differential duty system under which different machine tool components have to be invoiced and boxed separately. As to France, Mr. Keller felt it would be helpful to take steps to insure that credits extended by the United States are not used to expand the French machine tool industry on a subsidy basis.

As to our own tariffs on machine tools, Mr. Keller recommended that the present rates be maintained. "Our labor costs have doubled since before the war, and are two to four times as high as comparable wages in Europe. Also, some European countries have expanded their capacity during the war, and Britain, Czechoslovakia, Italy, Switzerland, Sweden, Belgium and France are highly competitive with us or will be so. These countries can sell simple tools at 30 to 50 per cent less than our factory prices."

Other tariff suggestions voiced during the hearings (those in the written briefs are held by the committee as confidential) were as follows:

By Mason Britton, Metal Cutting Institute, Hartford, Conn.: We are not concerned with what tariffs Great Britain, Australia, India or other countries put on. What we are concerned about is the embargo on the products of our industry which is now almost total. We just want the British embargoes taken off. We also want a continuation of the existing rates on imports into the United States.

By G. L. Weissenburger, president, Keokuk Electro-Metals Co., Keokuk, Ia.: The present duty on silvery pig iron and ferrosilicon is more than offset by lower production costs in Canada, Norway and France. Higher duties are required to protect the domestic industry.

By Karl D. Loos, Fluorspar Producers of the United States: The present tariff on metallurgical fluorspar is $6.30 a long ton or $5.624 a short ton. Considering that fluorspar of this grade now is selling at around $30 a short ton, this is not enough protection.

By R. H. Coolidge, Strom Steel Ball Co., Chicago: No foreign nations should be given a concession on steel balls, as no country needs a concession in order to be able to ship balls over our present tariff wall. Foreign producers have an even greater advantage than before the war due to widened wage differentials.

By F. A. Reed, sales manager, Niagara Machine & Tool Works, representing the Mechanical Press Builders Association: The present tariff protection on presses should be maintained. First, this industry does not have the protection against foreign competition which mass production methods afford to many other domestic industries. Second, our domestic industry is highly competitive, especially in view of its wartime expansion. On account of cost differentials, it is questionable whether we could hope to develop any large export business in our product.

By Herbert S. Blake Jr., Power Crane & Shovel Association: We are not here to argue against a tariff reduction; this industry feels it can stand on its own feet. We are here to request concessions from the 18 countries, or some of them. For example, to protect one Canadian producer which makes 1/2 to 2-cubic yard shovels in numbers entirely too small to meet the Canadian demand, the tariff to American manufacturers is 25 per cent, while the British preferential tariff is 10 per cent less 50 per cent. On shovels and allied excavating equipment not made in Canada the duty to the United States is 10 per cent while British imports are free.

Removed from Positive List

The following products, according to the Office of International Trade, have been removed from the Positive List of Commodities requiring validated licenses for export, and have been placed on general license for exportation to all Group K destinations:

Cooking and heating stoves and ranges, other than electric; parts for cooking and heating stoves and ranges; zinc dust; motors smaller than 1/8-horsepower; sheet metal ducts for blowing and ventilating systems; coal-tar pitch; xylol.

Act To Speed Procurement

Two newly formed subcommittees of the House Armed Forces Committee are acting on proposed legislation which, if passed, will remove much confusion in the government's dealings with industry in the event of another war.

The Procurement Subcommittee is considering a joint War-Navy request for authority to purchase by negotiation many items for which sealed bids now must be advertised. The subcommittee is going slow on one particular provision which would permit the services to make use of subsidies in order to keep manufacturers available as suppliers of certain essential military items whose production might not otherwise prove profitable or desirable.

The Mobilization Subcommittee is occupied with a study of the problems that may arise in mobilizing industry for a future war. At present the subcommittee is studying this M Day plan prepared by the War Department for World War II but never put into effect; some military spokesmen have advised the subcommittee that had that plan been pursued it would have cut the length of the war by six months. Chairman Paul W. Shafer (Rep., Mich.) of the Mobilization Subcommittee is seeking to evolve legislation under which planning would be carried to the point where, in case of a war, "all the manufacturers would have to do would be to take their contracts out of their safes and go to work."

Ease Export Rules for Cement

Producers of portland cement, faced with the prospect of closing plants because of insufficient storage space for their product, may file applications for export of cement without reference to the present export quota, Office of International Trade, Department of Commerce, has announced.

Despite the serious shortage of cement in many areas, the Office of the Housing Expediter, Office of Temporary Controls and OIT have agreed that this action will benefit domestic industry and the housing program by assuring maintenance of peak production of cement.

In filing export applications, producers must indicate that the quantities which they seek to export would not otherwise be produced, the OIT stated.

St. Lawrence Seaway Project Revived with Strong GOP Backing

Senator Vandenberg to sponsor perennial navigation-power proposal in 80th Congress. Project has been supported by government agencies and is accorded high priority by State Department. Financing plan altered

THE ST. LAWRENCE Seaway project will be revived in the 80th Congress, with strong Republican backing. In its technical aspects the project will be unchanged; it continues a double-barreled proposition involving Great Lakes-ocean navigation on the one hand and electric power on the other. But the plan to finance it will be altered fundamentally. By the terms of a bill now being written, seaway part of the project is not to be another handout of taxpayers' money. Rather, it is to be self-liquidating, on the basis of toll charges on ships and cargo passing through the seaway.

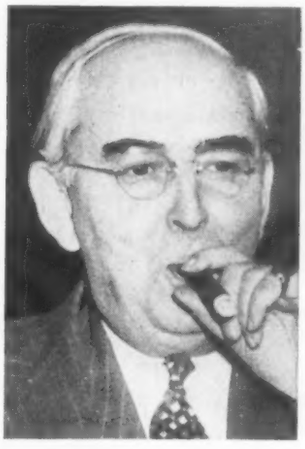
The bill is slated to bear the name of Sen. Arthur H. Vandenberg. The project has a high priority on the list of undertakings which the State Department wants carried out, as set forth in a report by Secretary of State George C. Marshall to Senator Vandenberg as chairman of the Senate Foreign Relations Committee. It is backed by all the government departments, with Interior as the most vocal advocate. A delegation from 25 mid-Western communities, comprising principally mayors and city managers of Detroit, Milwaukee, Chicago, Minneapolis, Duluth, Grand Rapids, Toledo and other cities, recently called on Senator Vandenberg to ask his support for the project. Not the least of the influences in its favor is that New York's Governor Dewey, in the face of violent objections from New York city business and banking, gave 100 per cent support for the seaway in a long message to the state legislature in January.

Seaway Vital to Inland Economy

Creation of the St. Lawrence Seaway is essential to prevent eventual collapse of the country's industrial heart—the areas bordering on the Great Lakes—in the opinion of Secretary Krug of the Interior Department. In studying the implications of wartime depletion of our mineral resources, he has reached the conclusion that calamity will overtake the economy of that area unless adequate steps, including completion of the seaway, are taken.

The Interior Department agrees that minerals should be imported into the United States, but not on a scale to threaten our flourishing mining industries. Interior believes that critical and strategic minerals should be brought in under the policy laid down in the Stockpiling Act of 1946. It believes that additional minerals should be imported in a growing volume, to keep our metals-using industries operating fully. But it is waging an active campaign in Congress against the widely-supported proposal that our future exports should be paid for in raw materials, and especially minerals.

The Interior Department view is: We must import minerals on a larger scale from here on, but let's do it in accordance with a policy that will pay off by helping rather than disturbing the home economy.



SEN. ARTHUR H. VANDENBERG

The first thing to do is take a national minerals inventory. After such an inventory has been taken, then, Interior believes, we will be in a position to shape up a minerals import policy. Undersecretary Oscar Chapman stated:

"The depletion problem affects not only the mineral areas but the metalworking areas of the Lake states. We will have to do two things: We will have to locate new mineral deposits, and we will have to develop low-cost processes for utilizing our low-grade ores. Unless we do those things, large mining areas will be shut down, and the impact on the states and areas directly concerned will be disastrous locally, and will spread out over the rest of the nation.

"Therefore, we have no desire to hasten an increase in imports of foreign minerals, except to build up stockpiles for security purposes, and to keep our industries operating fully. The policy to be followed must not ignore the necessity of keeping the American mining industry operating on an economic basis as long as possible."

The Interior Department is fairly optimistic as to the future of our minerals producing and using industries. Take, for instance, the question: How are we going to continue to be the greatest steel producing and consuming nation in the world when our best iron ore, in the Mesabi range, is expected to reach exhaustion in another 20 years? The department view is, first, we must learn how to make use of the vast quantities of low-grade iron ore about which we already have knowledge. Second, we must get additional information about ore that we probably have; that is, we must get the answer to the "hidden reserves" mystery.

The department view is that mining companies have not provided full information about the extent of their iron reserves because of the policy of the principal iron ore states of taxing reserves in the ground.

Assuming that larger minerals imports, in accordance with an intelligently formulated policy, will be necessary as time goes on, the St. Lawrence Seaway will be necessary insurance against needless upheavals in our present industrial areas.

"Whenever in the future we are forced to go to increased mineral imports, the whole metal fabricating industry of the Lake area will suffer a slow but profound shock resulting from the preference that the coastal areas will acquire—unless we build the St. Lawrence Seaway," says Mr. Chapman.

"Without the seaway, the foreign minerals would arrive at the coast ports. There would be a tendency for metal fabricating to move out of the Lake areas, particularly toward the east coast, to gain the advantage of lowest costs. . . . To stabilize the inland economy, therefore, carrying out of the seaway project is a necessity."

Value of Jap Plants for Reparations Under Study

Evaluation of Japanese industrial plants and equipment will be undertaken by a team of five American industrial engineers who have gone to Japan at request of Secretary of War Patterson to expedite action in reparations payments. The group is headed by Clifford S. Strike, president, E. H. McGraw & Co., and formerly deputy chief for reparations in Germany.

Efficiency of Workers Gains On West Coast

Trend spotty but definite improvement is seen accompanying tightening in labor market. Experience varies

SAN FRANCISCO

SIGNS ARE APPEARING here that worker efficiency is improving. Although the trend is spotty, enough plants have reported betterment to indicate a definite gain toward solving a problem that has plagued manufacturers all through the transition period. During the war efficiency was at a low ebb.

One large heavy industrial equipment producer here now reports productivity as approaching prewar levels. The betterment is attributed chiefly to improved relations between management and labor.

In a factory producing building materials worker efficiency now is better than during and immediately after the war, but has not yet reached prewar standards. A paper manufacturer says productivity is equal to 1940 levels. However, a large steel firm notes little change, though it reports it has been able to maintain stable output through maintenance of key men in the supervisory force. A large foundry reports worker efficiency now at the lowest point in its history.

One solution to the problem may be found when labor turnover slackens. The foundry reported above is basing hopes for greater productivity on a slackening in turnover. A building material maker, which reports efficiency at only 70 per cent to 75 per cent of prewar, also says turnover continues at a high rate. This company believes it will take a long-range program to raise per-man production—so it is planning to improve tools and mechanical aids. In some instances, failure of employee output to increase is traceable to restrictions on material supplies.

In general those plants reporting betterment indicate the improvement started when prospects for jobs began to decline.

$261 Million Tube, Trestle In Bay Area Recommended

Recommendation for construction of a $261 million low-level, six-lane, combination causeway and tube across San Francisco bay has been made the Secretaries of War and Navy by a six-man board composed of officers from both armed services. The board recommended that it be built immediately to ease traffic congestion and that consideration be given to a long-range rapid transit plan for the entire area.

The project would consist of a trestle about 3600 ft long, an underwater tube extending for 6400 ft, and a second trestle extending 15,000 ft. It would connect San Francisco in the vicinity of the foot of Army street with Fifth street in Alameda, a continuation to the Oakland mainland being effected by a cross-island freeway on Alameda and a new, four-lane tube under the Oakland estuary, emerging in the vicinity of Fifth, Clay and Washington streets in downtown Oakland. The main crossing from San Francisco to Alameda would be a little more than six miles long.

Housing Need Seen Check On California Industry

Leonard J. Roach, Los Angeles industrialist, last week termed lack of housing "the real bottleneck in southern California's industrial development."

"Many experienced workmen lack housing in the area," said Mr. Roach, "so that we find municipalities resorting to emergency living quarters for transient skilled labor that only in this manner can furnish even a makeshift force for construction and other industrial activity.

"The fact that critical building materials are being produced faster than at any time since the war has not yet alleviated the situation. It is discouraging to contemplate that in Los Angeles county, where some 3,600,000 persons now reside, there is really adequate dwelling space for approximately 3 million."

Ryan Aeronautical Books Sizable Aircraft Order

Contracts of the Army Air Forces with the Ryan Aeronautical Co., San Diego, Calif., have been increased by $700,000, it was announced last week. The new orders are extensions of contracts signed months ago for development of an advanced type of aircraft.

Ford Planning To Buy Parts In California

Program to be launched with exhibit of company's requirements in Los Angeles. Move seen aiding diversification

LOS ANGELES

FORD MOTOR Co. is inaugurating a $50 million parts-buying program in California as "a blank check toward furthering California's prosperity," according to K. T. Norris, president, California Manufacturers' Association and Norris Stamping & Mfg. Co.

Ford will hold a parts purchasing exhibit in Los Angeles on Feb. 19 and 20, at the Ambassador Hotel. It plans to buy requirements for 2600 different automobile and truck parts from California manufacturers.

The Los Angeles exhibits will open at noon, Feb. 19, with a civic luncheon at the Ambassador Hotel. A contingent of 16 Ford purchasing agents will accompany a group of Ford executives from Detroit, and manufacturers will be offered samples, blueprints and all production data on parts wanted.

C. S. Beesemyer, president of the Chamber of Commerce, said: "Up to the present, the automotive industry in southern California has been principally in assembly operations. Ford's offer to buy parts here will place us in a position where industry will support and create thousands of additional jobs."

Proposed Merger of Two Aircraft Firms Is Off

Harry Woodhead, president, Consolidated Vultee Aircraft Corp., and Robert Gross, president, Lockheed Aircraft Corp., last week announced they have decided not to pursue further the idea

Calendar of Meetings . . .

Feb. 17-24, American Road Builders' Association: 44th annual convention, Palmer House, Chicago. Association headquarters are in the International Bldg., Washington.

Feb. 18-20, Magnesium Exhibit, sponsored jointly by the Magnesium Association and the Army Air Forces, Wright Field, O.

Feb. 24-28, American Society for Testing Materials: Spring meeting, Benjamin Franklin Hotel, Philadelphia. Society headquarters are at 1916 Race St., Philadelphia 3.

Mar. 2-5, American Society of Mechanical Engineers: Spring meeting, Mayo Hotel, Tulsa, Okla.

March 17-19, American Institute of Mining & Metallurgical Engineers: World Conference on Mineral Resources, Waldorf-Astoria, New York. Headquarters are at 29 W. 39th St., New York.

Mar. 17-19, American Society of Lubrication Engineers: Annual meeting, William Penn Hotel, Pittsburgh. Program chairman is H. E. Mahncke, 135 S. LaSalle St., Chicago.

Mar. 17-19, Chicago Technical Societies Council: Production Show, Stevens Hotel. Paul A. Jenkins, 53 W. Jackson Blvd., Chicago 4, is executive secretary.

Mar. 19-22, American Society of Tool Engineers: 15th annual convention, Houston, Tex. Society headquarters are at 1666 Penobscot Bldg., Detroit 26.

of merging the two corporations, discussions concerning which were started last year. It was revealed that Mr. Woodhead will be elected a director of the Aviation Corp.

Thousands of New Firms Chartered in California

Frank Jordan, secretary of state in California, last week disclosed 7825 firms were incorporated in southern California in 1946 out of a total incorporation list of 11,412 throughout the state. The 1946 figure represents an average of 951 per month, increase of 144 per cent over the 4683 incorporations recorded in 1945.

Easing in Shipping Rules Expected on West Coast

Publication of a rule by Mar. 1 allowing southern California shippers to send freight eastward in consolidated carloads is expected by West Coast industrialists. According to the Los Angeles Chamber of Commerce, the rule also would permit freight forwarding companies to expand their eastbound services by broadening the list of articles which they may handle.

Dr. MacKenzie To Present Lecture at AFA Convention

Dr. James T. MacKenzie, chief metallurgist, American Cast Iron Pipe Co., Birmingham, has been chosen to deliver the 1947 Charles Edgar Hoyt annual lecture at the 51st convention of the American Foundrymen's Association to be held in Detroit Apr. 28-May 1, Sheldon V. Wood, president of AFA, has announced. Dr. MacKenzie's subject will be "The Cupola Furnace."

The lecture, inaugurating a new lectureship series named for the recently retired AFA treasurer in recognition of his thirty years of "highly valued service to the association and the foundry industry," will be presented by Dr. MacKenzie at a business meeting Apr. 30.

Suppliers Schedule Meeting

The American Supply & Machinery Manufacturers' Association will hold a regional meeting at Hotel Cleveland, Cleveland, Tuesday, Feb. 25.

Plan Symposium on Paint

The American Society for Testing Materials will hold a symposium on paint and paint materials Tuesday, Feb. 25, in the ballroom of the Benjamin Franklin Hotel, Philadelphia. Papers will be presented on methods of evaluating and testing industrial finishes.

Severe Coal Shortage Hampering Steel Output Throughout Europe

Reports from leading centers indicate serious curtailment is being necessitated. Nationalized Czechoslovakian industry ups production in January. Installation of additional capacity planned in France and Scandinavia

BELGO-LUXEMBURG exports of iron and steel showed a drop in November. There was a reduction of output due to shortage of coal and loss of two working days. However, November exports were comparable to September, and October was a record month.

Export demand continues considerable although there is a slackening from a few markets, but this is made up by the strong demand from most markets, especially the Near East, Malta, Cyprus, South America, South Africa and China.

Prices for Switzerland remain unchanged for supplies made during the first quarter of this year. Merchant bars are quoted at 4375 Belgian francs ($99.43) and structural steel at 4275 francs ($97.15) per ton.

There is a shortage of foundry pig iron in Belgium and government allocation is being urged. The domestic price for ordinary foundry iron is 1920 francs ($43.50) and hematite is 2600 francs ($59).

CZECHOSLOVAKIA

Output of iron and steel is increasing. Steel production in the nationalized works reached a postwar record in January with 183,960 metric tons, with rolled products at 126,500 tons. According to a Skoda works representative, negotiations have started with China with a view eventually to export steel products to that country. The Poldi steelworks has reopened a sales office in Belgium and is offering alloy, stainless and tool steels.

FRANCE

Regarding projected installation of a modern strip mill in northern France, it is reported by official sources that the hot rolling mill, with annual capacity of 650,000 tons, will be erected at the Denain Works of Acieries de Denain-Anzin, and the cold mill, with capacity of 250,000 tons, will be erected at the Montataire Works of Forges et Acieries du Nord et de l'Est.

Both concerns are to combine their resources. For the equipment coming from the United States it is proposed to utilize a credit of $23 million out of the $500 million loan from the Bank for International Reconstruction. The balance of the cost, about 3 billion francs ($25 million) will come from the concerns.

In connection with the Monnet reconstruction plan, it is reported France has the necessary iron ore to achieve proposed output of 15 million tons in 1955. Scrap will have to be conserved. Biggest problem will be in connection with coal, large tonnages of which will have to be imported.

Allocation of steel for the domestic market for the first quarter of this year will be only 1,100,000 metric tons, against 1,200,000 tons in the last quarter of 1946.

GREAT BRITAIN

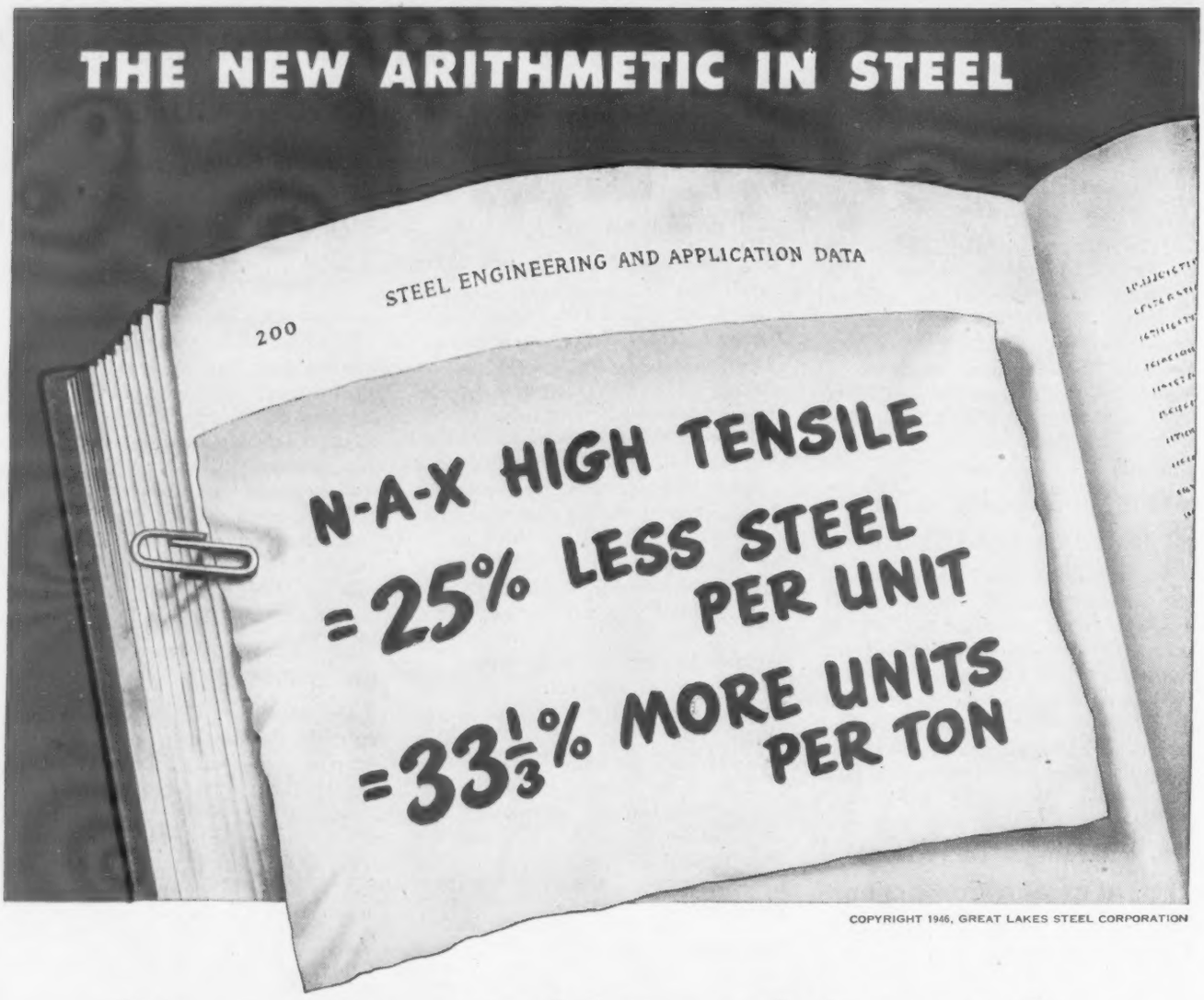
The situation in Great Britain is dominated by the shortage of coal. The position is so serious a scheme of allocation has been established, allowing not more than 50 per cent of works' previous quotas, with provision for extreme cases of the highest priority. As a result, many works are working only three or four days a week, and some have had to close down temporarily. The iron and steel industry has had its allocation reduced by 25 per cent.

According to the *Ministry of Labor Gazette*, 7,164,000 workers received net weekly increases of wages of £1,756,800 ($7 million) in 1946. The metal, engineering and shipbuilding industries accounted for 2,280,000 workers who received a weekly increase of £642,000 ($2,568,000).

SCANDINAVIA

Many developments are reported in the Swedish steelworks of Sandviken Jernwerks Aktiebolag. Increased production of tubes, cold rolled strip and wire is in prospect. A hot strip mill is to be erected within 2 years. A Wiberg-Soderfors furnace of 20,000 tons annual capacity is to be installed for making sponge iron. Electric furnace capacity will be increased to 70,000 tons a year.

In Norway a company has been set up to operate the state steelworks at Mo-i-Rana seaport. Blast furnaces are to be erected by Norwegian engineers, but foreign aid will probably be required for steel plant and rolling mills. All furnaces will be electric and Norwegian ore will be used. Expected steel output will be 200,000 tons a year or about half estimated consumption in 1959.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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Cold and snow slow automobile assemblies. Production expected to improve during remainder of month. Loss of car registrations from 1941 to 1946 only 9.23 per cent, indicating automobiles more durable than supposed

DETROIT

OLD man winter has been blowing hard on automobile plants, as well as on the rest of the country, in the past three weeks, with the result incoming truck shipments of parts and materials have been thoroughly snarled, outgoing of finished cars has been slowed, absenteeism and late arrivals at plants have mounted and an accelerating production pace throttled down. Just as it appeared the 100,000-mark for weekly assemblies would be passed, the ice cometh and output dropped back to 94,000, then to 91,000 and probably around 88,000 last week. A temporary shutoff of natural gas to scores of plants in the Detroit and Toledo area made further cutbacks necessary over the past two weeks.

Preliminary estimates of January production totals indicate 249,500 passenger cars and 103,300 trucks built in U. S. plants, plus 11,350 and 8140, respectively, in Canadian plants, for a grand total of 372,290. Despite two less working days and winter storm interruptions, the current month should better this total by about 15,000 units. This would be 4½ times the volume for the same month a year ago, although well below the figure of 509,332 for 1941.

Final figures for December production have been released by the Office of Temporary Controls, showing 380,908 units, and bringing the year's total to 3,268,456 cars and trucks, U. S. and Canada. The accompanying table has been revised to include latest official figures for 1946 which, incidentally, are within 0.6 per cent of the estimate made in STEEL, Jan. 6 issue. About one-third of the total was trucks and commercial cars—1,120,076 units. Canadian output aggregated 172,250 cars and trucks.

A surprising trend is revealed in latest statistics compiled by R. L. Polk & Co., indicating that one-third of the loss in passenger car registrations experienced between 1941 and 1944 was recovered in 1946. Specifically, there were 25,142,527 cars registered last year, only 9.23 per cent fewer than were registered in 1941. The drop from 1941 to 1942 was 12.94 per cent. Industry officials have been discussing the figures with interest, for they apparently show cars sold before the war have proved more durable than might have been guessed, since anticipated scrappage rates during the war failed to materialize. Over a 20-year period prior to the war, the normal passenger car scrappage averaged 1,897,764 cars annually.

Every state except California, Michigan, Minnesota and Nevada showed increases in registrations in 1946 over 1944. Alabama, Arkansas, Tennessee, Utah, Washington and West Virginia showed increases even over the 1941 totals.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1946	1941
January	126,082	524,073
February	84,109	509,332
March	140,738	533,878
April	248,108	489,856
May	247,620	545,355
June	216,637	546,278
July	331,000	468,897
August	359,111	164,793
September	342,969	248,751
October	410,510	401,369
November	380,664	373,892
December	380,908	302,518
12 ms.	3,268,456	5,108,992

Estimates for week ended:

	1947	1946
Jan. 25	93,278	29,410
Feb. 1	94,114	29,295
Feb. 8	90,995	23,785
Feb. 15	88,000	21,555

Exports Take 10.7 Per Cent

Further on the statistical front are tabulations of car and truck exports for 1946, disclosing 144,061 passenger cars and 186,129 trucks and commercial units were exported during the year, amounting to 7 per cent of production for the former and 25 per cent for the latter. About 10 per cent of the motor coaches built also were exported, making a grand total of 331,004 vehicles, or 10.7 per cent of national output. It is interesting to observe that more trucks were shipped abroad than passenger cars, and also to compare the percentage figure with the better than 50 per cent of automotive production which Great Britain is sending to foreign markets. Relaxation of export controls should release a far greater number of passenger cars from U. S. plants to feed to foreign markets, most of which are hungry for American equipment if they could only figure out some way to pay for them. One method, of course, used in the past, has been for American manufacturers to organize their own export-import organizations to arrange for export of automotive products on a two-way or even three-way barter basis, so that no actual currency is involved, only calculations on rates of exchange. Large importers like General Motors and Willys-Overland would welcome a resumption of such arrangements, freed from governmental red tape.

Serge Daniloff, manager-at-large for Packard Motors Export Corp., who has just completed 50,000 miles of air travel to South America, Europe and the Near East, found many misconceptions abroad growing out of the scarcity of new American cars. The most surprising was the belief in some quarters that cars were scarce because U. S. plants were still making armaments. He believes South America will replace Europe as the No. 1 market for automobiles in the next several years. Improvements in road systems and service facilities there, plus more buying power, are main reasons.

GM Australian Program

The so-called Australian car program of General Motors Holden's Ltd. in Melbourne, first announced in June, 1945, is progressing on schedule. Three test cars have been built in this country, road tested on the GM Proving Grounds and sent to Australia for further engineering tests under Australian conditions, together with three engineering test cars built there of local materials. The American phase of the program came to a close last November and all members of the special engineering groups which had been working on the development for two years left as a unit to continue in Australia. The contingent was the largest GM overseas group ever to set forth, and included 68 persons—31 men and their families. A special train from Detroit carried them to Vancouver, B. C., along with the test cars, engineering data and thousands of blueprints. The party sailed on the *S. S. Waganella* Dec. 4, and is now well established "down under."

Packard May Discontinue Six

According to present indications, Packard will discontinue the 6-cylinder en-

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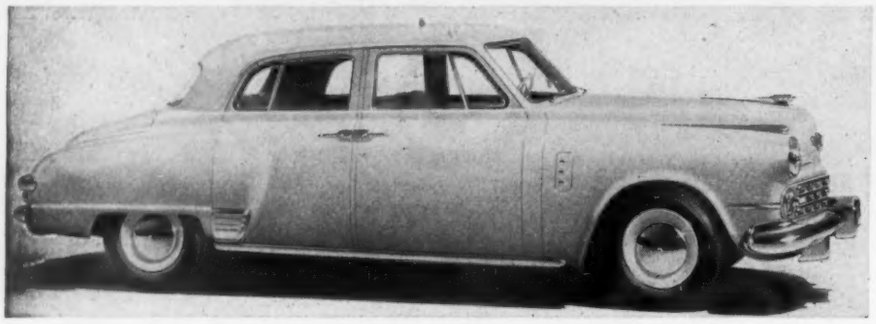

LAND CRUISER: Now in production is this luxury model Studebaker. Although following the company's ultra-modern styling, the Land Cruiser is longer, roomier and more richly appointed than any previously announced models. It will be available only as a 4-door sedan

gine in its forthcoming series of new models, concentrating on three series of 8-cylinder types. A bank of sixes has been built up of sufficient size to take care of the balance of the current model run and future use of the engine will be confined to taxicabs and replacements. The present 8-cylinder engine will be continued and a new 8-cylinder design introduced. The next series of models probably will be identified as the 1948 series, and while it is completely tooled and ready to go now, probably will be deferred until fall before introduction.

There are a dozen or more test cars now being driven around the Packard plant and proving ground. Those who have seen them report the front end styling duplicates the design illustrated in STEEL for Feb. 3, p. 82. The nose or hood front has been rounded off and the radiator grille lowered to conform to the current styling of other producers. Outline of the chrome plated grille continues the conventional Packard radiator shell lines.

Await Foreman Union Ruling

Packard officials are awaiting with interest the Supreme Court decision on the question of unionization of foremen. This dispute dates back to Oct. 19, 1944, when the Foremen's Association of America petitioned for certification of representatives with the NLRB. In April, 1945, an election was held among Packard foremen, with 666 voting for the FAA, 435 against and 155 votes not counted. At the time there were 1286 foremen out of 27,913 total employees in the plant. Refusing to recognize the FAA as bargaining agent for foremen, the Packard management determined to see the case through the courts, and a petition for review of the Circuit Court decision was filed with the Supreme Court last Oct. 30.

A vote on the question today might bring a far different result from the 1945 poling. Thus, employment on Jan. 29 had dropped to 7979, of which only 374 were foremen, or only 30 per cent of the 1945 crew. Considering that many of the foremen in 1945 probably had been elevated to their positions from the ranks of the UAW-CIO and likely were rabid union adherents, along with the fact 435 voted against FAA at that time, it is conceivable nearly all of the present foremen would oppose such representation. Further, some observers have concluded the Supreme Court is measuring its decisions against the political weather, changed since last November, so they feel the high court may reverse the Circuit Court decision.

Composite Cylinder Head

An innovation in automotive engine design, currently being fooled around with in engineering departments and foundries, is a composite type of cylinder head construction in which the lower half is a solid gray iron casting, uncored for water passages. To this is brazed or welded an upper section of pressed steel, properly formed to accommodate spark plug recesses, water passages and the like. The idea, of course, is to get away from the cost of coring a single head casting and the attendant difficulty of cleaning out sand from cored passages. The difficulty with the proposed design is in devising a suitable welding or brazing setup to join the stamping to the casting on a production basis. A suggestion has been advanced that the design be modified to comprise two castings, suitably recessed on the mating surfaces to form water jacketing and with a gasket between them.

Other long-range engine projects now in the developmental stage include a new type of V-8 valve-in-head engine which is being given consideration for possible future use in Buick, Olds and Pontiac lines.

Stockholders Approve Sale

Graham-Paige stockholders approved by a wide margin the sale of the company's automotive assets and transfer of $3 million in liquid assets to Kaiser-Frazer Corp. Of the 5,024,033 outstanding voting shares, 59.3 per cent approved the agreement and less than 4 per cent were opposed. In exchange K-F will issue to G-P 750,000 shares of common stock and will assume interest and principal of G-P debentures due in 1956, amounting to $8,524,000. The switch will give G-P a 21 per cent interest in K-F in the form of 1,000,000 shares of common stock.

Principal benefit to K-F will be substantial bolstering of working capital which has been further reinforced by extension of a $12 million credit by the Bank of America.

Tank History Chronicled

Experience of Chrysler Corp. in the wartime production of tanks has been recapitulated and highlighted in a 144-page book written by Wesley W. Stout and illustrated in color. Copies are available from the company, title being, "Tanks Are Mighty Fine Things."

Tax Comment in Error

Comment in this department for Feb. 10 on tax problems confronting industry was in error in stating 38 per cent corporate taxes had to be paid quarterly on current earnings. The tax must be paid quarterly, but on profits of the preceding year. This makes the drain on cash positions no less onerous, however, particularly when the further factor of a virtually enforced distribution of a minimum of 70 per cent of profits after taxes in the form of dividends to avoid penalties is taken into consideration.

Auto Engine Rebuilders Plan Convention for May 22-24

Plans for a silver anniversary convention on May 22, 23 and 24, 1947, are being made by the Automotive Engine Rebuilders Association. Detroit will be the scene of the meeting with the Hotel Statler as convention headquarters. The session, first to be held in two years, will be devoted to business meetings, special conference periods and talks concerning problems of the industry.

The conference booth idea, used in past conventions, is being resumed, and special conference periods will be set aside from program sessions.

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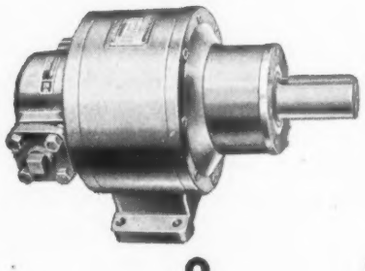

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Chambersburg Displays New Drop Hammer

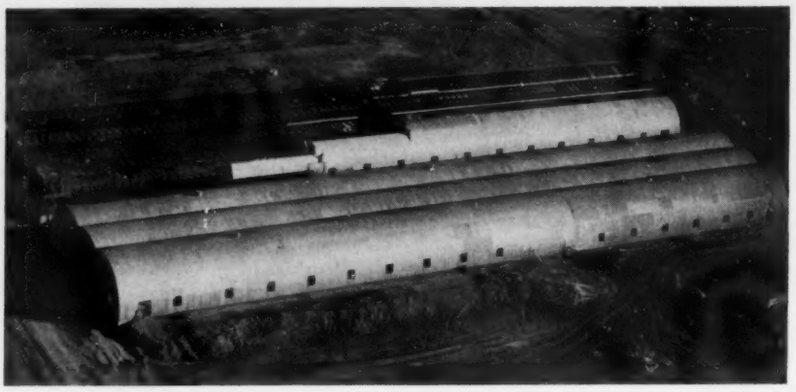
Officers of Chambersburg Engineering Co. are hosts to industrial writers at first public preview of "boardless drop"

RECENTLY, Eugene Clarke, president, and R. E. Harrison, vice president, Chambersburg Engineering Co., Chambersburg, Pa., held an open house and luncheon on the occasion of their announcement and working demonstration of a new type of drop hammer in which steam or compressed air lifting replaces the traditional roller-and-board friction lift.

According to Messrs. Clarke and Harrison, the new hammers will be of importance in two distinctly new fields; one being in the demanding "hammerhead" weights over 5000 lbs (generally thought of as the steam drop hammer area); the other in the field under 1000 lbs (wherein small pneumatic-lift and belt-lift drops are common).

Demonstrations to the attending editors indicated that the new "boardless drops" are capable of delivering an unusually large number of blows per minute because of their quick return. By getting in a greater number of impacts while the metal is at proper forging heat, fewer blows actually are needed to complete a given drop forging job. This also tends to improve forgings, according to the designers of the new hammer. The controls of the new machine simulate those of a conventional board drop—both in location and in effect—so that operators do not have to learn any new skills.

In addition to studying the new hammer, the visiting editors were shown a unique "submerged system" for heat-treating and tempering piston rings for hammers. Heating is done by a high frequency coil below the surface of the quenching oil, thus eliminating scaling. Also, they were shown a self-contained pneumatic hammer capable of such rapid action that heat generated by plastic-working of the metal exceeded that lost through radiation.



QUONSET-TYPE FACTORY: Faced with a 2-year delay in the construction of additional plant capacity, York-Shipley Inc., York, Pa., manufacturers of residential, commercial and industrial oil-fired equipment, is rushing to completion two large Quonset-type manufacturing plants. These buildings will soon provide 60,000 sq ft of plant space

Work on New G-E Atomic Power Lab To Begin Soon

Construction of the Knolls Atomic Power Laboratory at Niskayuna, N. Y., near Schenectady, by the Atomic Energy Commission will start this spring, L. E. Johnston, area engineer for the commission, has announced. The laboratory will be erected under supervision of General Electric Co., Schenectady, N. Y., which will operate it.

Part of the Knolls laboratory plant will be devoted to an experimental atomic pile, and another building in the group will house a 3,500,000-volt electrostatic generator for atom-smashing studies. J. Gordon Turnbull Inc., Cleveland, is architect.

Allis-Chalmers Appoints New Regional Sales Managers

At a conference at Allis-Chalmers Mfg. Co., General Machinery Division, Milwaukee, changes were announced for the division's field organization with a new grouping of district sales offices under regional managers. W. F. Taylor, former district manager in Boston, will supervise the New England area. D. S. Kerr, who will handle the Southeast, was manager of the Atlanta, Ga., office. The Southwest will be supervised by J. L. Pratt, who has been manager at Dallas, Tex. A. J. Schmitz will continue to direct operations for the Pacific Coast area.

Babcock & Wilcox To Erect Huge Steel Drum for Navy

Babcock & Wilcox Co., New York, has been awarded the contract for construction of a 223-ton steel pressure vessel for testing underwater equipment at the new Naval Ordnance Laboratory at White Oak, Md., by Charles H. Tompkins Co., Washington.

The vessel will be a cylindrical drum, 30 ft long, with an inside diameter of 100 in. and a shell thickness of almost 4 in. It will be constructed of steel with an ultimate tensile strength of 70,000 lb per sq in. and will have a working pressure in the drum of 1000 lb per sq in.

One end of the drum will consist entirely of a quick-opening door, closing against a ring welded to the outside of the cylinder; this door will seal against 1000 lb operating pressure and will withstand a test pressure of 2000 lb per sq in.

Babcock & Wilcox will construct the drum at its Barberton, O., plant. The door, forming the end of the drum, will be cast by Adamson United Co., Akron, which will also cast the ring against which the door will close.

ASTM To Dedicate New Headquarters on Feb. 26

Dedication of the new headquarters building of the American Society for Testing Materials on Philadelphia's Parkway will be held Feb. 26 with Dr. G. H. Clamer, senior living ASTM past president, presenting the building to President Arthur W. Carpenter.

In connection with the dedication a dinner will be held at the Benjamin Franklin Hotel at which Dr. E. U. Condon, director, National Bureau of Standards, will deliver the principal address.

Honor Employees for Long Service at Cummins Co.

Seven officials and employees who have completed at least 25 years of consecutive service with Cummins Engine Co. Inc., were awarded gold recognition pins recently at the factory in Columbus, Ind.

A total of 445 pins and individual service certificates were presented to Cummins employees who had five or more years of consecutive service.

BRIEFS . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Van Syoc Industries Inc., Detroit, manufacturer of tubular products, has moved its central offices from Detroit to Community Bank Bldg., Napoleon, O. New address will also be headquarters for company's subsidiaries, Napoleon Tool & Machine Co., Syco Products Co. and Lockett Mfg. Co.

—o—

Pennsylvania Flexible Metallic Tubing Co., Philadelphia, has opened a Los Angeles branch under direction of Arnold J. Dovey.

—o—

Gridley Farm Tool Co., Gridley, Ill., has been sold to A. J. Conn, president, LaSalle Engineering Co. and A. F. Anderson Iron Works, both of Chicago. Mr. Conn plans to add to the Gridley company's line of farm equipment.

—o—

United Chromium Inc., New York, manufacturer of electroplating materials, has formed United Chromium Ltd. with offices in Toronto, Canada, under the direction of James Guffie.

—o—

General Motors Corp., Detroit, this spring will exhibit in Chicago its experimental train, a project to try out advanced ideas for improvement of railroad travel.

—o—

Risselt Valve Division, Cincinnati, Lodge & Shipley Co., held a distributors' meeting recently in which an industrial valve was introduced that has application for steam processing where pressure does not exceed 110 pounds.

—o—

American Welding Society, New York, has announced the 1947 A. F. Davis Undergraduate Welding Award consisting of cash prizes totaling $700 to be given to the authors and publications for the two best articles on welding published in undergraduate magazines between July, 1946, and April 1, 1947.

—o—

Sylvania Electric Products Inc., Ipswich, Mass., has announced plans to produce, distribute and service commercial marine radar systems.

—o—

Krausse Tool & Engineering Inc., Houston, Tex., has been purchased by Reed Roller Bit Co., Houston. The Krausse company, now producing tools and sheet metal products, will be operated as a division of the Reed firm.

—o—

Liquid Conditioning Corp., Linden, N. J., manufacturer of equipment for water softening and conditioning of process liquids, announces appointment of Engineering Sales Corp., Boston, as its New England representative.

—o—

American Chemical Society, New York, reveals that the synthetic aliphatic industry produced more than $1 billion worth of material last year for antifreeze, brake fluids, cleaning fluids, etc.

—o—

Donn Purchasing & Sales Service, Pasadena, Calif., has been formed to handle the purchases of firms who do not have their own purchasing departments.

—o—

American Iron & Steel Institute, New York, is supporting a research program at National Bureau of Standards, Washington, on reinforced concrete.

—o—

Bryant Heater Co., Cleveland, has named Bryant-McCoy Co. and Bryant-Schaak Co. as representatives for its heating equipment in Jamestown, N. Y., and Clearwater, Fla., respectively.

—o—

Raybestos-Manhattan Inc., Passaic, N. J., has opened a Cleveland office at 1071 Union Commerce Bldg. under direction of R. F. Tobin. Combined in this headquarters are former separate divisional offices of Manhattan Rubber Division, Asbestos Textile & Packing Division, Equipment Sales Division and United States Asbestos Division.

—o—

Pond Engineering Co., Springfield, Mass., has been sold to American Time Corp., Springfield. The Pond company, which will be known as Pond Engineering Division, will continue to manufacture automatic controls for machine tools.

—o—

Carboloy Co. Inc., Detroit, has appointed as its distributor Rickert Industrial Supply Co., Milwaukee.

—o—

Michigan Tool Co., Detroit, manufacturer of gear production equipment, has named Anderson Machine Tool Co., St. Paul, as its representative.

—o—

Essex Wire Corp., Ft. Wayne, Ind., has secured a $7 million loan from Metropolitan Life Insurance Co., which will be used as additional working capital.

—o—

American Locomotive Co., New York, and **Baldwin Locomotive Works,** Eddystone, Pa., will build two locomotive chassis for the first two experimental gas turbine engines burning powdered coal. The entire research and developmental program of the coal-fired gas turbine project now approximates $3 million.

—o—

St. Regis Sales Corp., New York, subsidiary of St. Regis Paper Co., is moving its wire tie production facilities from Oswego, N. Y., to Cleveland where it has leased the former plant of North American Mfg. Co.

—o—

Hupp Corp., Cleveland, manufacturer of automobile accessories, will spend $2,750,000 in expanding its operations which involve production of unfilled orders exceeding $20 million.

—o—

Frederic B. Stevens Inc., Detroit, maker of foundry supplies, has just completed a 2-story addition to its facing mill.

—o—

Hewitt Rubber Division, Buffalo, Hewitt-Robins Inc., has appointed Hawaiian Equipment Co., Honolulu, as its distributor of industrial hose and belting throughout the Hawaiian Islands.

—o—

Rapids-Standard Co. Inc., Grand Rapids, Mich., materials handling equipment, has announced a profit sharing plan in which the company will contribute from 10 to 25 per cent of yearly profits to a trust fund to provide future welfare and security to its employees without cost to them.

—o—

Hydropress Inc., New York, machinery manufacturer, announces its western representative, P. F. Bronckhurst, will move his office from Denver to San Francisco.

—o—

Air Reduction Sales Co., New York, will feature a new electronic tracing device for oxyacetylene cutting machines at the Western Metal Congress at Oakland, Calif., Mar. 22-27.

—o—

Horizons Inc., Princeton, N. J., has been newly formed for research in metallurgy, chemistry and ceramics.

—o—

Apex Electrical Mfg. Co., Cleveland, is introducing a new cabinet-type, domestic ironer which can be folded into a small cabinet.

—o—

United States Rubber Co., New York, has established graduate fellowships in chemistry at ten leading universities.

—o—

United States Steel Supply Co., Chicago, subsidiary of U. S. Steel, has announced that with the year 1946 its St. Louis plant has completed its fourth consecutive calendar year without a lost-time accident. Perfect safety records for 1946 were also attained by the company's Cleveland and Milwaukee plants.

The Business Trend

Tight Steel Sheet Supply Checks Industrial Pace

AN AUTOMOBILE production decline brought about by insufficient supplies of sheet steel resulted in a slight recession in STEEL's industrial activity index for the week ended Feb. 8. At 155 per cent (preliminary) of the 1936-1939 average of 100, the index is two points below the preceding week and three points below the postwar high of 158.

Auto output in the week ended Feb. 8 amounted to 90,995 passenger cars, trucks and busses, compared with 94,114 in the previous week.

A hindrance to high industrial production currently and for some weeks in the future has been extremely cold weather and resultant gas shortages in some areas, necessitating the closing of many plants that are of prime importance as providers of materials and components. While the gas shortage has curtailed steel finishing operations, ingot production remains around the postwar high of 92.5 per cent of capacity.

COAL—Estimated production of 13,770,000 tons of bituminous coal in the week ended Feb. 1 set a new high for 1947 and also exceeded the highest point reached in 1946.

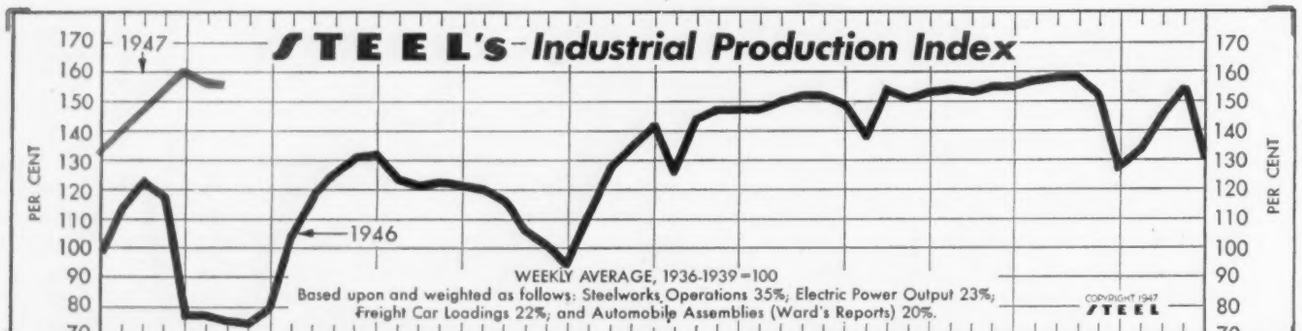
PRICES—Prices advanced on most commodity groups during the week ended Feb. 1 but lower prices for foods helped prevent a rise in the weekly wholesale commodity price index of the Bureau of Labor Statistics. The index remained at 140.3 per cent of the 1926 average of 100.

RAILROADS—Decline in estimated net income, after interest and rentals, of class I railroads in 1946 to $287 million has been reported by the Association of American Railroads. For 1945 it was $447,384,678.

OUTLOOK—An industrial production rate between 170 and 180 per cent of the 1935-1939 average of 100 is expected in 1947 by more than a third of 11 of the nation's top economists who appraised the business outlook at the National Industrial Conference Board's latest economic forum. This compares with an average index (unadjusted) of 170 for the first 11 months of 1946.

STEEL CASTINGS—Shipments of steel castings in 1946 totaled 1,424,226 tons, a 27 per cent decline from the 1945 total of 1,942,477 tons. However, movements in each of the last four months of 1946 exceeded those of the corresponding months of 1945.

BUSINESS FAILURES—With the number of business establishments growing, the number of business failures is increasing, a Dun & Bradstreet compilation showing total failures thus far this year about 124 per cent over those of the corresponding period of last year. Relative to new businesses, the National Industrial Conference Board reports the "little fellow" is entering business in large numbers, with more than three-fourths of the wartime decline in the total number of firms being recovered. It seems probable, said NICB, that the number of firms in business may exceed the prewar high by as many as from 300,000 to 500,000.



The Index (see chart above): Latest Week (preliminary) 155 | Previous Week 157 | Month Ago 148 | Year Ago 75

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)‡	92	92.5	90	5.5
Electric Power Distributed (million kilowatt hours)	4,700†	4,777	4,853	3,983
Bituminous Coal Production (daily av.—1000 tons)	2,295	2,189	1,891	2,120
Petroleum Production (daily av.—1000 bbls.)	4,650†	4,650	4,531	4,690
Construction Volume (ENR—Unit $1,000,000)	$111.5	$94.5	$90.4	$55.5
Automobile and Truck Output (Ward's—number units)	90,995	94,114	64,828	23,785

* Dates on request. ‡ 1946 weekly capacity was 1,762,381 net tons. † Preliminary.

TRADE				
Freight Carloadings (unit—1000 cars)	833†	835	831	713
Business Failures (Dun & Bradstreet, number)	45	65	37	27
Money in Circulation (in millions of dollars)‡	$28,295	$28,265	$28,748	$27,929
Department Store Sales (change from like week a year ago)‡	+10%	+17%	+38%	+21%

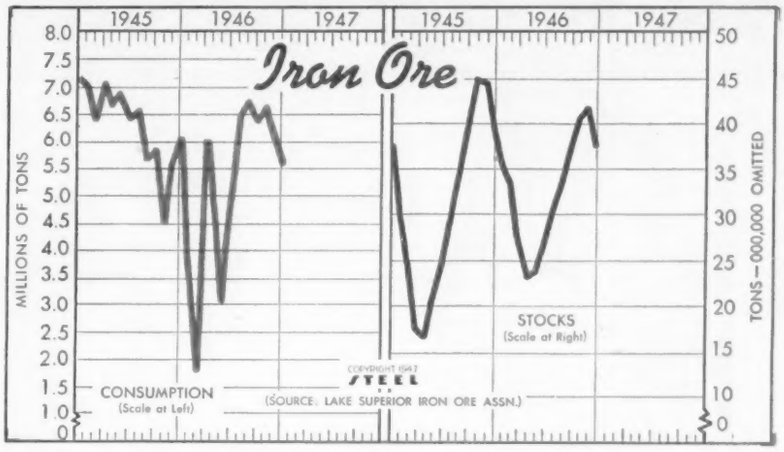
† Preliminary. ‡ Federal Reserve Board.

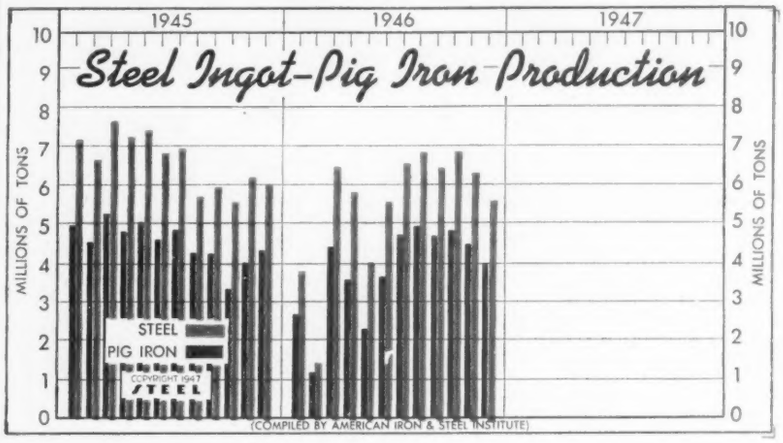
Iron Ore

(Lake Superior Iron Ore Assn.)

Gross tons—000 omitted

	Consumption		Stocks at Lake Erie Docks and furnaces	
	1946	1945	1946	1945
Jan.	3,719	6,983	35,342	30,889
Feb.	1,748	6,371	33,647	24,577
Mar.	6,021	7,082	27,601	17,304
Apr.	4,769	6,642	23,079	16,429
May	2,990	6,872	23,905	20,715
June	4,995	6,397	26,265	24,847
July	6,460	6,532	30,439	29,485
Aug.	6,738	5,658	34,067	34,781
Sept.	6,380	5,837	37,573	39,549
Oct.	6,625	4,491	40,435	45,090
Nov.	6,131	5,611	41,919	44,706
Dec.	5,516	6,099	37,465	39,059
Total	62,093	74,576	.....	.....





Iron, Steel Production

(Net Tons—000 omitted)

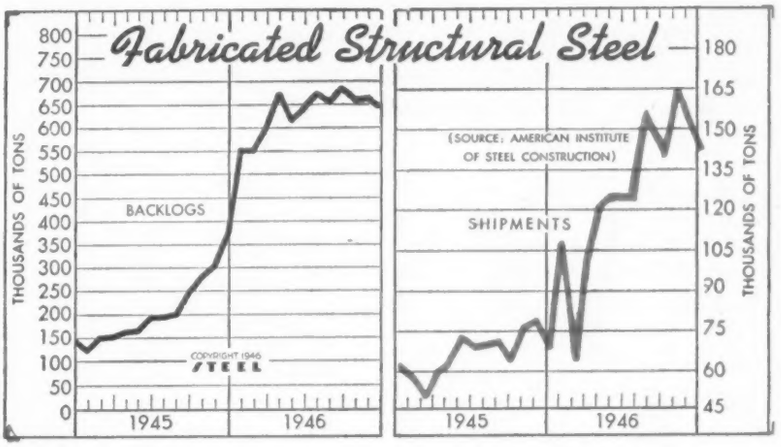
	Steel Ingots			Pig Iron	
	1946	1945	1944	1946	1945
Jan.	3,872	7,204	7,593	2,645	4,945
Feb.	1,393	6,653	7,194	1,148	4,563
Mar.	6,507	7,706	7,826	4,424	5,228
Apr.	5,860	7,290	7,594	3,614	4,786
May	4,072	7,450	7,703	2,275	5,016
June	5,625	6,841	7,234	3,682	4,605
July	6,610	6,986	7,498	4,705	4,812
Aug.	6,887	5,735	7,499	4,898	4,249
Sept.	6,518	5,982	7,235	4,687	4,227
Oct.	6,910	5,597	7,621	4,815	3,388
Nov.	6,409	6,200	7,279	4,435	4,026
Dec.	5,701	6,058	7,366	3,992	4,323
Total	66,364	79,702	89,642	45,379*	54,167

*Adjusted.

Fabricated Structural Steel

(000 Tons)

	Shipments			Backlogs		
	1946	1945	1944	1946	1945	1944
Jan.	107.5	57.0	35.2	552	124.4	113.1
Feb.	63.8	49.0	42.9	551	151.6	117.6
Mar.	102.8	59.5	41.4	605	153.3	106.3
Apr.	122.5	62.8	44.5	674	162.5	111.2
May	124.4	72.6	50.7	615	165.7	116.3
June	126.8	69.2	43.0	642	195.2	122.7
July	140.2	69.9	45.3	674	194.0	125.4
Aug.	157.5	70.6	55.2	651	201.1	130.4
Sept.	141.9	63.4	57.5	682	248.5	151.1
Oct.	164.7	76.6	61.6	660	282.8	174.4
Nov.	157.3	78.0	59.4	665	304.9	184.2
Dec.	142.1	68.8	61.3	646	375.2	142.5
Total	1,551.6	797.4	597.9	...	....	....



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$13,276	$12,735	$14,072	$11,736
Federal Gross Debt (billions)	$259.1	$259.9	$259.3	$279.4
Bond Volume, NYSE (millions)	$27.9	$31.3	$27.1	$34.8
Stocks Sales, NYSE (thousands)	7,908	7,033	5,146	8,754
Loans and Investments (billions)†	$55.8	$56.0	$56.2	$68.2
United States Gov't. Obligations Held (millions)†	$35,636	$36,171	$36,029	$49,656

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$69.36	$69.36	$69.14	$58.27
All Commodities†	140.3	140.3	139.1	106.8
Industrial Raw Materials†	152.6	152.1	153.1	118.9
Manufactured Products†	135.6	136.0	134.1	102.9

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

ALEXANDER L. FEILD

W. H. WILLIAMS

ROBERT H. HOGE

Alexander L. Feild has been appointed associate director of research laboratories, American Rolling Mill Co., Middletown, O. He had been director of research laboratories of the Rustless Iron & Steel Corp. prior to that company's affiliation with the Armco organization.

—o—

David C. Moore, International Business Machines Corp., New York, has been promoted to sales manager of the International Time Recording Division of the company. Previously manager of the ITR Division in the New York sales office, he is succeeded by **Robert R. Chase** who held a similar position in the Buffalo office.

—o—

C. G. Carter has retired after 40 years service with the Liquid Carbonic Corp., Chicago. A director since 1932 and president of the corporation from 1939 to 1941, Mr. Carter will act as special consultant to the president of the corporation.

—o—

Anthony Caputi has been appointed to the sales engineering staff, Dubois-Webb Co., Detroit.

—o—

G. Edward Pendray has been appointed counsel in public relations for Crucible Steel Co. of America, New York.

—o—

Holmes Brown has been appointed director of public relations, American Locomotive Co., New York. He succeeds **Lynn Mahan** who has resigned to form his own public relations firm.

—o—

Philip Scheibner, president, Associated Iron & Metal Co., Oakland, Calif., has been appointed chairman of the bundlers committee of the Institute of Scrap Iron & Steel Inc., Washington.

—o—

W. H. Williams, one of the founders of Clark Controller Co., Cleveland, and for the past two years president of the company, has been elected chairman of the board. He is succeeded as president by **Robert H. Hoge.**

—o—

Palmer E. Hanson has been named manager of the Foundry Molding Equipment Division, Arcade Mfg. Division of Rockwell Mfg. Co., Pittsburgh. Mr. Hanson has been an engineer and sales executive in the foundry equipment industry for 25 years.

—o—

The following promotions have been made in the organization of Manufacturers & Fabricators Inc., Elyria, O.: **O. H. R. Roffey** has been named vice president, **John H. Wehmhoff,** sales manager and **Vernon L. Smith,** purchasing agent.

—o—

R. S. Campbell, president and general manager, New York Shipbuilding Corp., New York, has resigned.

—o—

John A. Hyslop has been appointed Cleveland district manager, Detroit Steel Products Co., Detroit. He succeeds **H. K. Strock,** who has been transferred to the Dallas, Tex., office.

—o—

J. J. Mellon, associated with Allen-Bradley Co., Milwaukee, has been appointed chief engineer of that company to succeed **Gustav O. Wilms.**

—o—

Clarence G. Felix has been appointed works manager of the Cincinnati plants of Crosley Division, Aviation Corp., New York. He was previously manager of radio sales, and has been associated with Crosley since 1927.

—o—

L. Y. Pulliam, elected recently to the board of directors, Glidden Co., Cleveland, has been elected a vice president of the company. **Nestor B. Betzold** was elected to the board of directors, and **Paul E. Sprague** to the executive committee.

—o—

F. B. Langreck has been appointed technical adviser and **J. M. Graham Jr.** and **W. Kenneth Menke** assistant directors of Monsanto Chemical Co., St. Louis, in the general development department.

—o—

Hubert Merryweather, Bethlehem Steel Co., Bethlehem, Pa., has retired as general manager of ore properties. He had been with Bethlehem for 36 years.

—o—

Sir Frederick Bain has been nominated as next president of the Federation of British Industries. Sir Frederick, who was recently knighted, is deputy-chairman of Imperial Chemical Industries Ltd., London, Eng.

—o—

Col. Sir W. Charles Wright has retired as chairman, Guest Keen Baldwins Iron & Steel Co. Ltd., Port Talbot, Eng. He is succeeded by **J. H. Jolly,** former deputy chairman. Sir Charles Wright will remain on the board of the company.

—o—

Paul Huber, formerly assistant director, General Motors Proving Ground, Milford, Mich., has been named director of research for Willys-Overland Motors Inc., Toledo, O. **Robert E. Busey,** formerly executive engineer in charge of new developments, White Motor Co., Cleveland, has been placed in charge of truck

Shipped to you in 8 hours!

When you need standard stainless steel bars, remember that your nearest Armco Distributor can usually ship your order from his stockroom the same day it is received.

Even when you want special shapes or grades, your order can be filled quickly through Armco's Rustless Division. More than 60 standard and special grades of bar and wire are rolling from Armco's mills.

IS THIS THE ANSWER?

If you have never used stainless bars or wire, would they make your products more efficient or more salable? Consider the excellent corrosion resistance of ARMCO Stainless bars and wire; their high tensile and yield strengths; their scaling resistance and high creep strength at elevated temperatures; their long service life and handsome appearance.

Whatever products or parts you make, stainless steel may be the way to greater sales and higher profits.

20-YEAR SPECIALISTS

Armco Distributors can offer you the help of our 20-year backlog of experience in the production of Stainless Steels. Research engineers of our Rustless Division have closely studied machining practices and investigated cutting rates, tool materials, lubricants, and other fabricating problems.

You can get the benefit of this experience — plus quick action on your orders — by calling or writing your nearest ARMCO Stainless Bar and Wire Distributor. If you do not know him, wire or write the Rustless Division, The American Rolling Mill Company, 3405 E. Chase Street, Baltimore, Maryland.

The American Rolling Mill Company • **Middletown, Ohio**

Rustless Division of ARMCO

Look First to ARMCO for Stainless Steel Bars and Wire

engineering for Willys-Overland. Other changes in Willys-Overland engineering include the following: **Walter F. Benning** has been named technical assistant to **D. G. Roos**, vice president and director of engineering, and also will be in charge of passenger car engineering; **Leo O. Burt** will be passenger car chassis engineer; **Charles Cuma**, engine development engineer; and **F. L. Mills**, chief draftsman of the Chassis Division. **Charles E. Schutte** will be chief engineer of the Body Division, with **A. C. Smith** assistant chief engineer. **Charles E. Barber** is named body engineer in charge of mechanical engineering, and **Fred M. Baker**, chief draftsman of the Body Division. **C. B. Warner** is named product specifications engineer; **D. D. Stone**, research engineer, and **W. R. Westphal**, chief test engineer. **E. C. DeSmet** is assistant to the vice president in charge of engineering and will have charge of design, styling and surface development. **P. C. Johnson** is named assistant to Mr. Roos and will have charge of labor relations, experimental production, procurement and budgets. **L. E. Calkins** is named chief chemist, **R. P. Kelly**, electrical engineer and **A. J. Junker**, truck chassis engineer.

—o—

Dr. Winton I. Patnode, chemist on the staff of the research laboratory, General Electric Co., Schenectady, N. Y., has been placed in charge of the Hanford branch of the laboratory at Richland, Wash.

—o—

Bennett S. Chapple Jr. has been appointed an assistant vice president of sales, United States Steel Corp. of Delaware.

—o—

William W. Gould, Thomas A. Edison Inc., West Orange, N. J., has been appointed manager of the Cleveland office. He was formerly field engineer of the Edison Storage Battery Division of the company, with headquarters in Philadelphia. Mr. Gould succeeds **Alva E. Redcliffe** as district manager at Cleveland. Mr. Redcliffe has become associated with B. I. Florey, Cleveland representative of the Automatic Transportation Co., Chicago.

—o—

Otto W. Winter has been elected president and general manager, Acme Pattern & Machine Co., Buffalo. Mr. Winter, a former national president of the American Society of Tool Engineers and, at present, national chairman of ASTE's Education Committee, has had broad and varied experience in the machine and tool industry.

—o—

Fred L. Born, the Carborundum Co., Niagara Falls, N. Y., has been named sales representative in the Dallas, Tex., district to succeed **William Crocker**, who has been transferred to the Houston area.

—o—

D. J. Dunlop, formerly general night superintendent, Pontiac Motor Division, General Motors Corp., Detroit, has been appointed assistant to the general manufacturing manager. **Buell E. Starr**, formerly general day superintendent, has been named manufacturing manager.

—o—

Raymond L. Collier has been appointed executive vice president, Gray Iron Founders' Society Inc., Cleveland. He was formerly executive secretary of Steel Founders' Society of America.

—o—

Howard Goodman, formerly vice president, Varcum Chemical Corp., has been appointed sales manager, General Abrasive Co. Inc., Niagara Falls, N. Y.

—o—

John Lauritsen, general manager, J. B. Kendall Co., Washington, has been appointed director and vice president of the company. **Mason B. Pebbles** has been appointed general manager and vice president in charge of the company's warehouse in Norfolk, Va.

—o—

Dr. James T. MacKenzie, chief metallurgist, American Cast Iron Pipe Co., Birmingham, has been elected to the board of directors of that company. **C. D. Barr** was re-elected president of the company; **C. O. Hodges Sr.**, vice president and treasurer, and **S. D. Moxley**, vice president in charge of purchasing and engineering; **J. J. Swenson**, vice president in charge of sales and secretary, and **F. B. Shannon**, assistant secretary.

—o—

Gifford-Wood Co., Hudson, N. Y., has promoted three members of the sales organization: **William E. Herb**, eastern district manager, has been promoted to general sales and advertising manager. **Walter G. Engler**, western manager, has been named eastern district manager with headquarters in New York. **William J. Chalmers** has been appointed western district manager with headquarters in Chicago.

—o—

Charles G. Andrew, operating and engineering executive, Air Reduction Co. Inc., New York, has been elected president of the Compressed Gas Manufacturers' Association.

—o—

W. C. Straub has been appointed sales representative for New England territory, Monitor Controller Co., Baltimore, Md.

—o—

James M. Darbaker, Carnegie-Illinois Corp., Pittsburgh, subsidiary of U. S. Steel Corp., has been named manager of the Chicago office of Carnegie-Illinois to succeed **Walter E. Hadley**, who has retired.

—o—

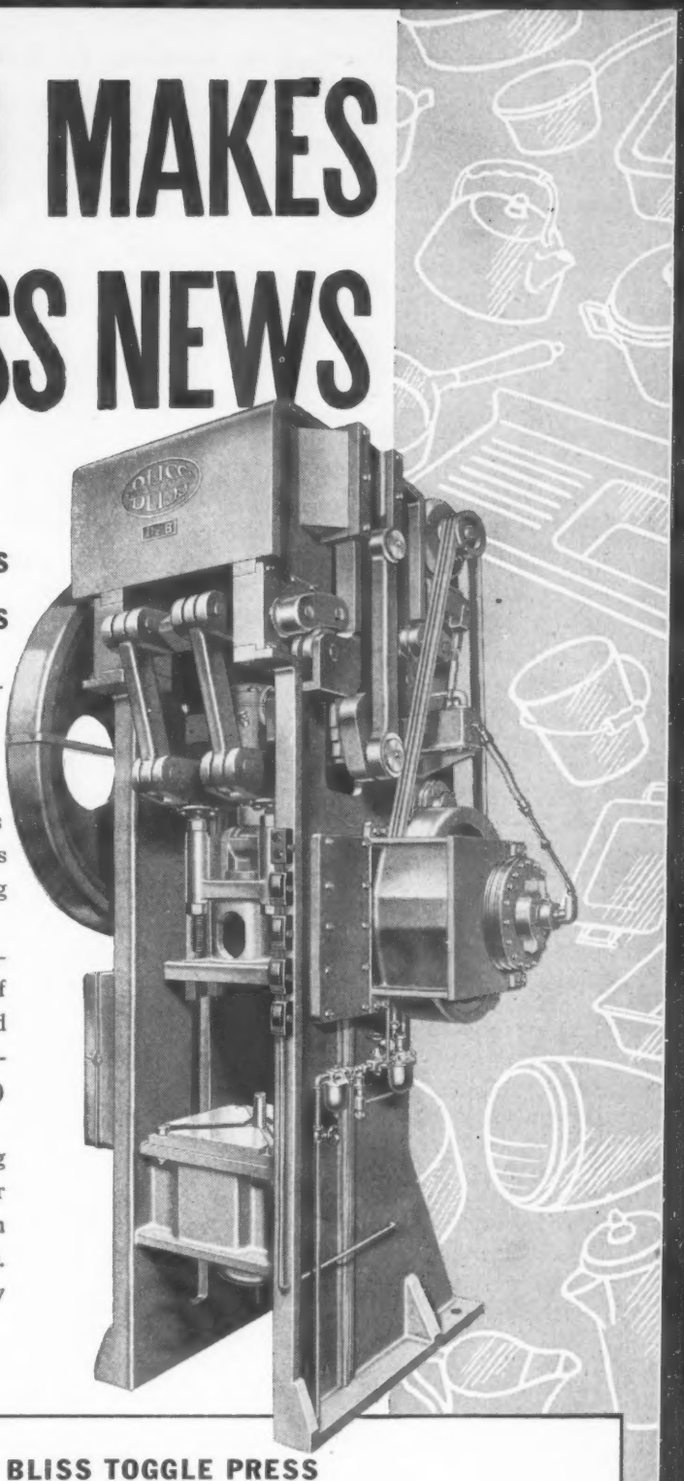
N. D. Ely has been elected vice president and general manager, L. A. Young

BENNETT S. CHAPPLE JR.

RAYMOND L. COLLIER

JAMES M. DARBAKER

BLISS AGAIN MAKES TOGGLE PRESS NEWS



New Single-Crank Line in 8 sizes offers many design and operational advances

Always the pioneer in advanced toggle press engineering, Bliss now presents a new single-crank line, designed for increased drawing production and efficiency. If you draw cooking utensils, hollow ware and shells of any type, deep or shallow, from steel, brass copper, aluminum or other metals, these 1947 presses will prove profitable additions to your stamping equipment.

The new line comprises eight sizes of presses, ranging in shaft diameter from 4¼″ to 7″ and in length of stroke from 8½″ to 24½″. Die-space dimensions and operating speeds remain the same as those for corresponding models in the previous line (Nos. 1½ to 4A) thus permitting interchange of tooling.

Analyze the improved factors in the adjoining check-list of new features, incorporated only after thorough engineering research and testing. And then ask a Bliss Sales Engineer to provide complete details. He'll be glad to show you how to apply these new presses to your individual production problem.

FEATURES OF NEW BLISS TOGGLE PRESS

1. **Frames are one-piece stress relieved steel weldments...** resulting in weight-savings, and reduced floor space requirements.
2. **New toggle drive** provides crosshead with long gibways at position most needed...reduces bearing overhang... renders greater accessibility.
3. **New Bliss Single Disc Pneumatic Friction Clutch,** with one-station electric pushbutton control...air brake for stopping flywheel.
4. **Direct-connected liftout in bed.** Liftout rods are outside specified bed area, leaving space between uprights free and clear...handwheel adjustment on center liftout rod.
5. **Steel rockshafts,** yokes and links in blankholder mechanism.
6. **Steel gearing throughout.**
7. **Crankshaft, rockshafts, intermediate shaft** and link pin bearings are bronze bushed...roller bearings on driveshaft and flywheel.
8. **Bliss Manifold Lubrication System,** with metal tubing leading to each bearing.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

WORKS AT: Brooklyn, N. Y.; Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Derby, England; St. Ouen sur Seine, France • SALES OFFICES: Detroit; Brooklyn; Cleveland, Dayton, Toledo, Ohio; Lansing, Mich.; Chicago; Philadelphia; Rochester; New Haven; Boston; Toronto.

STAY AHEAD WITH *Bliss*

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

ARTHUR McCUTCHAN

LEONARD MESSER

R. S. LYNCH

Spring & Wire Corp., Detroit. **Thomas Couper** and **Grant L. Cook** were elected to the board of directors.

—o—

Arthur McCutchan has been appointed senior research engineer, product engineering and research department, Tube Turns Inc., Louisville, Ky. He had been associated for 20 years with the Engineering Division of Detroit Edison Co.

—o—

A new administrative committee has been appointed by the American Locomotive Co., New York. Members of the committee are vice presidents **Perry T. Egbert, William L. Lentz, William S. Morris** and **Norman C. Naylor; Herman Press,** treasurer, and **James D. Vaughn,** comptroller. **Duncan W. Fraser,** chairman of the board of directors, will serve, ex-officio, as a member of the committee. **Robert B. McColl,** president of the company, will preside over the committee.

—o—

Leland Hazard has been elected to the board of directors of Pittsburgh Plate Glass Co., Pittsburgh, succeeding **Robert L. Clause** who recently resigned as a director. He has been vice president of the company for the past several years.

—o—

A. R. Hough, Reliance Electric & Engineering Co., Cleveland, has been appointed sales representative for the southern territory, with headquarters in Knoxville, Tenn. He succeeds **Arthur L. Pollard** who has retired. Besides Reliance Mr. Hough will also represent four other manufacturers of electrical equipment: Weston Electrical Instrument Corp., Newark, N. J.; the Meriam Instrument Co., Cleveland; the Cornell Dubilier Electric Corp., South Plainfield, N. J.; and the Superior Electric Co., Bristol, Conn.

—o—

Dr. James B. Fisk, industrial research physicist, has been designated by the Atomic Energy Commission to direct its division of research. He has been associated with the Bell Telephone Laboratories Inc., New York.

—o—

Leonard Messer has been elected president of the American Chemsol Corp., Coraopolis, Pa., which recently announced opening of a large bulk plant to service industrial users of cleaning and process solvents. Technical Division of the company is headed by **Louis Marchetto.**

—o—

William L. Hunter, formerly chief engineer, has been named general manager, Northern Equipment Co., Erie, Pa. **Harold A. Schlieder** succeeds Mr. Hunter as chief engineer. **Francis W. Bunting** has been appointed assistant chief engineer.

—o—

Doctor W. L. McCracken has been appointed director of research and manager of alkali manufacturing by Detrex Corp., Detroit.

—o—

O. B. J. Fraser has been appointed assistant manager of the Development & Research Division, International Nickel Co. Inc., New York. He succeeds **H. J. French** who was recently made assistant vice president of the company. Associated with the company since 1917, Mr. Fraser has been director of technical service on International Nickel's mill products for the past 13 years.

—o—

William M. Bausch has been appointed district sales manager for Pittsburgh area, Follansbee Steel Corp., Pittsburgh. For the past five years he has been manager of orders in the Pittsburgh office and is succeeded in that position by **Freeman J. Hoffman** who recently returned from four years' service in the Air Corps. **S. C. Goodnough** has been named assistant manager of orders.

—o—

Hiram Winternitz Jr., president, Charles Dreifus Co., Pittsburgh, has been re-appointed chairman of the Export Committee of the Institute of Scrap Iron & Steel Inc., Washington.

—o—

Dr. Wadley R. Glenn and **R. S. Lynch** have been elected to the board of directors of the Atlantic Steel Co., Atlanta. The following officers have been elected by the board: **Charles F. Stone,** chairman of the board; **R. S. Lynch,** president; **W. R. Glenn,** vice president; **H. B. Johnson,** vice president; **Gilbert Purvis,** treasurer; **J. N. Goddard,** secretary; and **M. C. Sarran,** assistant secretary. Prior to joining the Atlantic Steel Co. in 1944, Mr. Lynch had been associated with the United Alloy Steel Corp., Canton, O.

—o—

Sir Samuel Beale has retired from the chairmanship of John Lysaght Ltd., Newport, Eng., and is succeeded by **Sir Charles Bruce-Gardner,** recently released as chief executive for industrial reconversion, by the president of the Board of Trade. Sir Samuel Beale retains his seat on the board of Lysaght.

—o—

William T. Gossett, New York attorney, has been named vice president and general counsel of the Ford Motor Co., Dearborn, Mich.

—o—

Ralph D. Hawkins has been appointed to the sales department of Ajax Electric Co. Inc., Philadelphia. He will represent the company in Kentucky, Indiana, and in the Cincinnati area of Ohio.

—o—

L. A. Behrendt, manager, Crucible & Refractories Division, Joseph Dixon Crucible Co., Jersey City, N. J., was elected president of the Crucible Manufacturers Association. He succeeds **R. E. Burdett,** president, American Crucible Co., North Haven, Conn.

—o—

K. A. Johnson, president, Wisconsin Culvert Co., Madison Wis., has been

DWIGHT P. JOYCE

Who has been appointed president, Glidden Co., Cleveland. Noted in STEEL, Feb. 10 issue, p. 90.

STEPHEN S. CONWAY

Appointed vice president, sales, Brake Shoe & Castings Division, American Brake Shoe Co., New York. Noted in STEEL, Feb. 10, p. 86.

ROBERT S. SOLINSKY

Elected president, Can Manufacturers Institute, Washington, for 1947. Noted in STEEL, Feb. 10 issue, p. 88.

elected president of the Toncan Culvert Manufacturers Association. He succeeds **Harold J. Bair,** president, Empire State Culvert Association, Groton, N. Y., who was elected secretary and treasurer of the association. **F. V. Romig,** vice president of the Beall Pipe & Tank Corp., Portland, Oreg., was elected vice president.

—o—

Earle V. Grover, president, Apex Steel Corp., Los Angeles, has been appointed to head the Manufacturing & Industries Committee of the Los Angeles Chamber of Commerce. **Henry Clark,** manager of southern California Buick-Oldsmobile-Pontiac Division, General Motors, was named chief of the Transportation Committee. **Carleton B. Tibbetts,** president and general manager of the Los Angeles Steel Castings Co. has been named chairman, Industrial Development Committee.

—o—

V. E. McMullen has been promoted to executive vice president, Cummins Engine Co. Inc., Columbus, Ind., and **R. E. Huthsteiner,** has been promoted to vice president and general manager. **Leonard W. Beck** has been appointed general sales manager and **Waldo M. Harrison** as controller.

—o—

The Bryant Heater Co., Cleveland, has established two new representatives for their line of gas-fired heating equipment. In Jamestown, N. Y., **Philip W. McCoy** has established the Bryant-McCoy Co. at 10th and Monroe Sts. In Clearwater, Fla., **Paul J. Schaack,** has established the Bryant-Schaack Co., 1011 Pine Brook Dr.

—o—

Walter Wallace has been appointed president, Oldbury Electro-Chemical Co., Niagara Falls, N. Y. He succeeds **F. Austin Lidbury** who has resigned as president and treasurer. Other new officers include **Dr. Earl L. Whitford,** vice president; **Dr. Marion B. Geiger,** secretary; and **Arthur T. Hinckley,** assistant secretary.

OBITUARIES . . .

Thomas F. McLaughlin, 55, president of Eastern Stainless Steel Corp., Baltimore, died suddenly at his home in Baltimore on Feb. 10. He was elected president and general manager of the Eastern Rolling Mill Co., predecessor to the Eastern Stainless Steel Corp., in 1944. Previous to his affiliation with the Eastern company, Mr. McLaughlin had been assistant to the president of Crucible Steel Co. of America, New York, and prior to that, vice president of Rustless Iron & Steel Corp., Baltimore.

—o—

Rufus N. Hemenway, 74, died Feb. 9 at Daytona Beach, Fla. He had recently retired as vice president of the Fafnir Bearing Co., New Britain, Conn.

—o—

M. E. First, director in charge of engineering, C. O. Bartlett & Snow Co., Cleveland, died Feb. 9. Before joining Bartlett & Snow he had been manager of both the Indiana Harbor and Alliance, O., plants of the American Steel Foundries, Chicago.

—o—

Ernest J. Wagner, 48, president, the Superior Drawn Steel Co., Monaca, Pa., and the Standard Steel Specialty Co., Beaver Falls, Pa., died Feb. 11.

—o—

Charles F. Marble, 81, former treasurer of Curtis & Marble Machine Co., Worcester, Mass., died Feb. 7.

—o—

Martin Fenneberg, 57, purchasing agent for the Westinghouse Electric Supply Co. at Milwaukee, died recently.

—o—

George A. Forsyth, 49, partner in the Forsyth Engineering Co., Houston, Tex., and former Milwaukee engineer, died Feb. 3 of a heart attack.

—o—

Dr. Frederick G. Ring, 64, former special engineer on foreign projects, Bethlehem Steel Co., Bethlehem, Pa., died recently.

—o—

Joseph C. O'Brien, chief engineer, Pittsburgh Gear & Machine Co., died suddenly in his home in Pittsburgh recently. He was a founder of the American Gear Manufacturers' Association.

—o—

Howard L. Anderson, for 35 years associated with the old American Sheet & Tin Plate Co., now part of the Carnegie-Illinois Steel Corp., U. S. Steel subsidiary, died Feb. 9 at LaJolla, Calif.

—o—

Albert C. Lange, 55, former president, Crucible Steel Casting Co., Milwaukee, died recently.

—o—

William J. Graveson, 51, eastern seaboard manager, Chevrolet Division, General Motors Corp., Detroit, for 23 years, died at Dobbs Ferry, N. Y., Feb. 3.

—o—

Arthur E. Palmer, 64, field representative for the Engine Sales Department, Caterpillar Tractor Co., Peoria, Ill., died in New York recently.

—o—

Rowland W. Barr, 47, manager of the Dredge Division, Bucyrus-Erie Co., Milwaukee, was killed in a railroad accident at Raleigh, N. C., Feb. 3.

FLUX-INJECTION Stainless

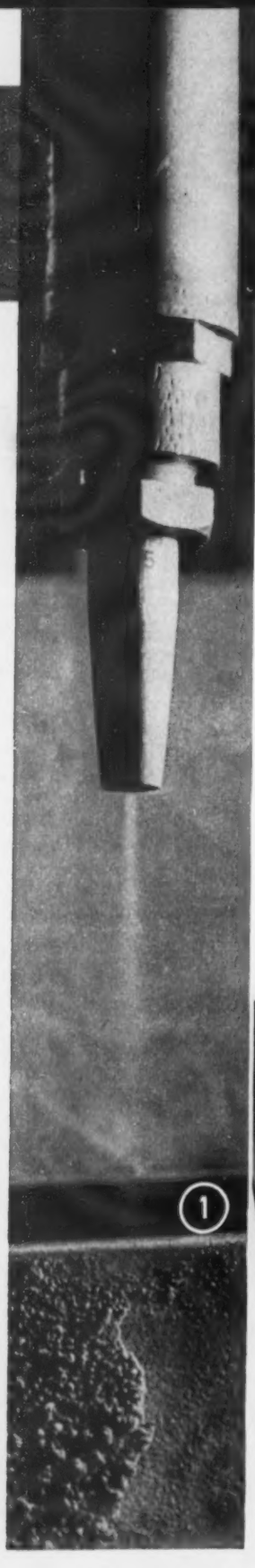


Fig. 1—Special oxide-eliminating flux in powder form, carried by cutting oxygen stream itself, emerges from tip directly at point of cut

Fig. 2—As flux clears oxide layer away, oxygen attacks the steel, making a true oxidizing cut. Here a No. 40 Radiograph is used to start a cut in a 2 in. slab of 18-8 stainless steel

Fig. 3—Nesting and interfitting of shapes, a scrap-saving technique long used in standard flame cutting, is applied to stainless steel with flux-injection

By G. E. BELLEW
Steel Mill Specialist
Air Reduction Sales Co.
New York

WHEN flux-injection cutting was first announced, together with its results and economy in cutting stainless steels comparable to mild steel cutting, the general response was "show me," a reaction not exactly surprising. Previous attempts to flame cut stainless were not satisfactory, either in results or economies. Many steel men had reluctantly come to believe that success was out of the question.

Today, with the flux-injection process established as a routine production procedure in many fabricating shops, warehouses, foundries and steel mills all over the country—cutting everything from 1/8-in. sheet to heavy slabs and billets—many previous skeptics are confirmed advocates of the method. Tests and experiment showed the results to be beyond their best hopes, in a class with regular flame cutting of mild steels. By standards of previous stainless cutting methods, the results on a basis of either cost or quality are almost beyond comparison.

Because the composition of stainless steels placed them beyond the reach of standard oxyacetylene cutting as practiced for years in all types of mill and shop opera-

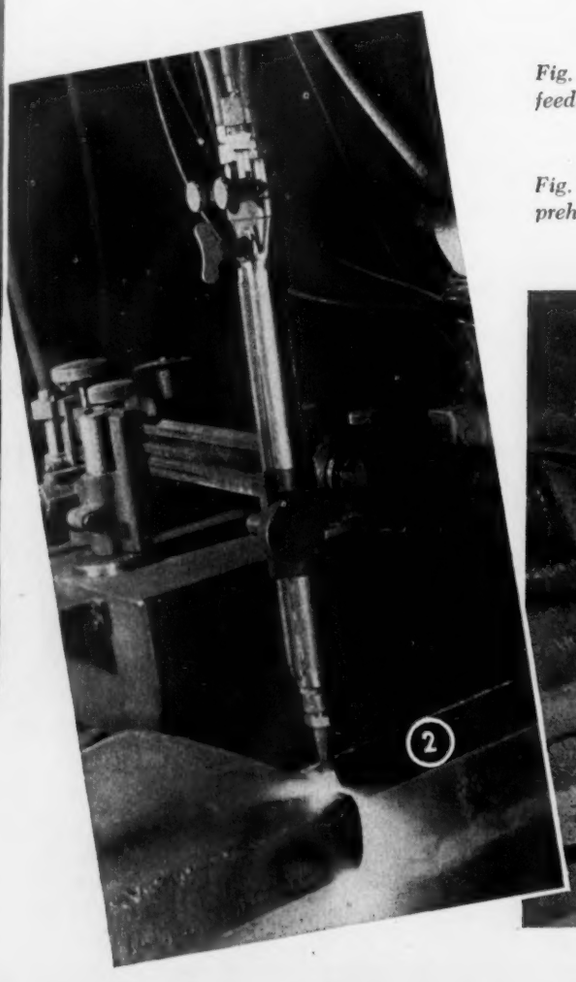
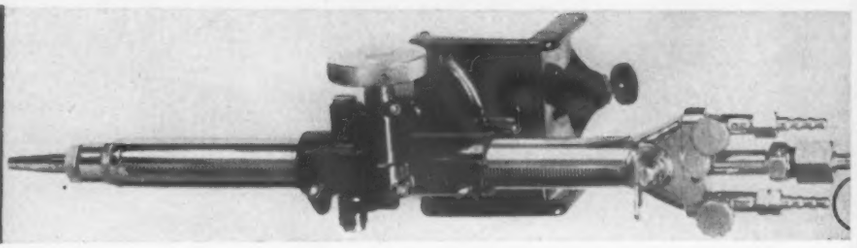


Fig. 4—Standard Oxygraph setup with flux feeding unit for shape-cutting stainless. Courtesy Smith & Caffrey Co.

Fig. 5—Typical 3-hose torch, fitted with heavy preheat style tip, used for flux-injection cutting

CUTTING Steels



Injected directly into the cutting-oxygen stream, flux chemically removes obstructing oxides to expose fresh base metal to the cutting jet in this latest process of severing stainless. Fundamentals, capacities and advantages of the method are described in this first of a two-part article

tions, users of stainless were compelled to depend on either a melting cut or machining methods to sever and shape-cut these valuable alloys.

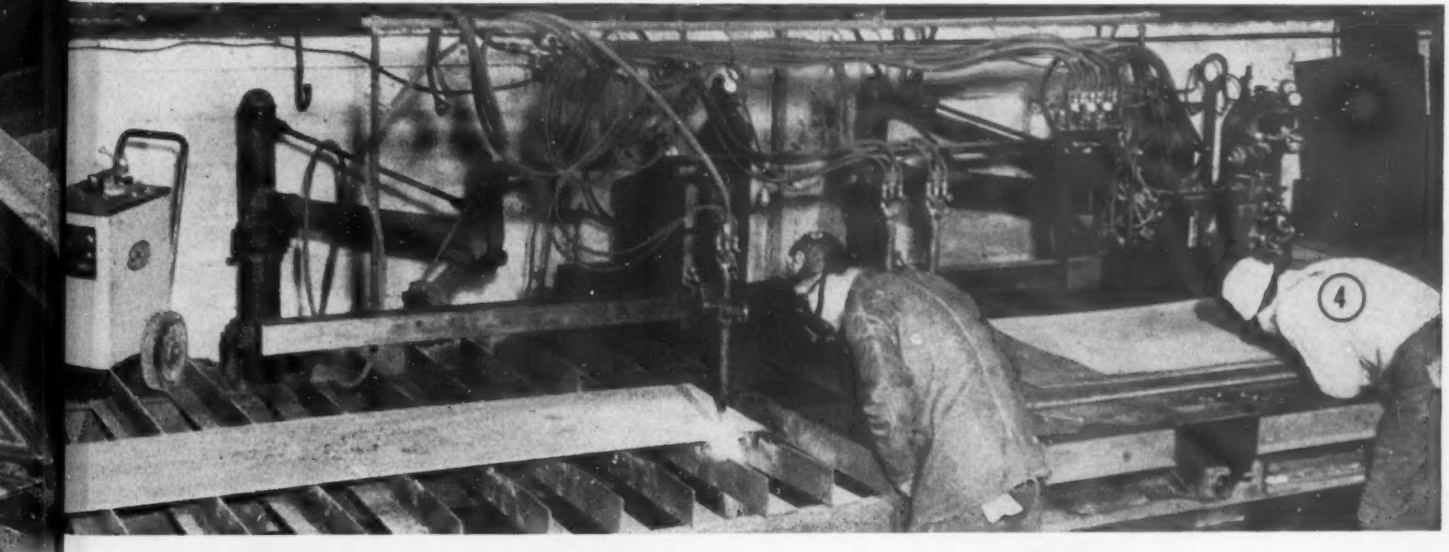
Several melting-type cutting means were used to sever sections of various thicknesses from thin sheet to heavy risers. One, basically, used an iron or mild steel "waster"—either a plate, a welding bead laid along the line of cut, a starter rod or other means. The heat from oxidizing this "waster" served to melt and flow away the stainless steel beneath. Similarly, stainless-clad steel could be cut, after a fashion, from the mild steel side. Although these makeshifts would result in severance, tolerances of dimension and quality had to be extremely wide if the results were to be acceptable. Since the tolerances in almost all stainless steel work are on the close side, the method was not satisfactory except in the rarest of cases.

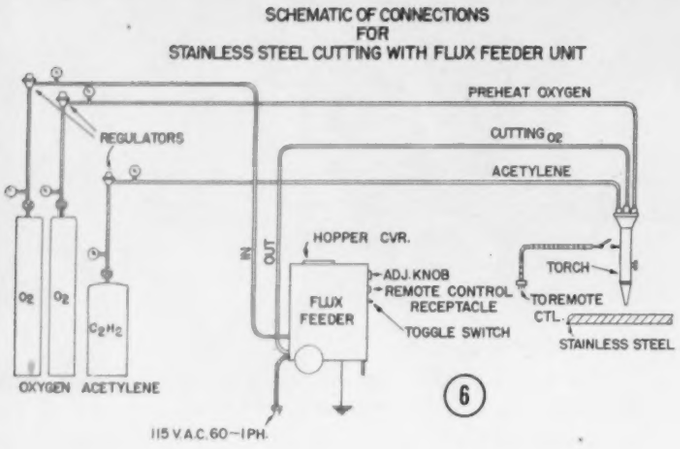
This is true, also, of the carbon-arc method of cutting. Here, too, severance can be achieved, but only the crudest sort of cut is obtained—rough, jagged, and unusable surfaces remain, requiring a large amount of machine finishing. Although refinements of the melting methods, using complicated and expensive equipment, were able to yield a somewhat improved cut, they generally did not reach flame cut quality of the type obtained on mild steel, and could not fill its place in stainless steel work on a basis of either quality or economy.

Remaining alternative for cutting stainless steels, then, was machining. It is true that milling, boring, sawing, and combinations of these, turned out precision cuts of superb quality, but the cost factor was a major problem. Machining, particularly of stainless steels, is a slow operation, requiring not only heavy and expensive equipment, but a considerable outlay in high-priced labor, too. When only an occasional part is to be cut, this problem is not so serious, but when production requirements demand many multiples of a shape, or many shapes of various types, machine output per day would run so low that either overall efficiency would suffer and production would lag, or several costly machines would have to be used simultaneously—again raising costs.

Since stainless alloys, considered only as a class of metals, are inherently a high-cost group of materials, every cost factor affecting the transformation of slab, sheet, plate or shape to a finished product is important. Of course, there are many applications of stainless steel where its corrosion and/or heat resisting properties are so essential that cost is only an unfortunate fact of life. But, on the other hand, there are many, many possible uses for stainless where, although its qualities would be highly desirable and quite valuable, cost requirements are such that it is ruled out in favor of less suitable materials which, on an economic basis, are satisfactory substitutes.

Over the past 35 years, since stainless was first developed, the cost factors affecting its range of uses were whittled down one by one, as standard processes were adapted to fit the physical and metallurgical behavior of the alloys. Oxyacetylene and arc welding, spinning, drawing and stamping, forging, heat treating, even machining operations, were modified and adapted—often to a con-





siderable degree, but always on an economic basis—to these steels, until some time ago, a very important standard steel working process had been so adapted except flame cutting.

This lack of a low cost, flexible method of performing a fundamental steel-working operation on stainless was a serious cost problem to the men who more and more found in stainless steels the ideal material for many industrial applications. Availability of a flame cutting process would cut costs in those applications where the alloys are "musts," and make possible its economic use in many borderline applications as well. Hence, many efforts were made to solve the problem.

Nature of the fundamental difficulty was well known and easily understood. Its source is the alloying elements of the stainless steel itself. These alloying elements, particularly chromium, oxidize with great speed, particularly at high temperatures, and the resulting inert layer of oxides is dense and impervious.

Since the chemistry of flame cutting is that of oxidation—and since chromium oxides which keep the cutting oxygen from reaching the steel melt at a point beyond the temperature of even the oxyacetylene flame—this layer of refractory oxides effectively prevented a true, or burning, flame cut on stainless steels by conventional methods. The ideal solution to the problem, theoretically and practically, was to afford continuous elimination of the oxides, so that a fresh surface of unprotected metal could be constantly presented to the action of the oxygen stream. A fluxing method was suggested by Mr. George Linnert of Rustless Iron & Steel Corp., and study of the possibilities was undertaken by research and field engineers of Air Reduction Sales Co.

To translate the theory into a practical process, two questions had to be answered. First—what flux? Second—how to apply it? The practical solutions called for a lengthy, stubborn research job, which was made no easier by the requirements that operating costs, quality and flexibility should be in line with ordinary mild steel cutting operations. Eventually, the right, chemically efficient flux was developed and a relatively simple, mechanically efficient means of applying it was worked out. The result of this investigation made cutting of stainless steels by oxidation practical, and opened up the field of flame cutting to these valuable materials. The process which was developed was descriptively called flux-injection cutting. After exhaustive testing and field trials, judicious refinements and corrections in original calculations and equipment were made, and the flux-injection process was deemed ready for commercial (*Please turn to Page* 115)

Fig. 6—Schematic diagram of cylinder-torch connections used for the flux-injection process

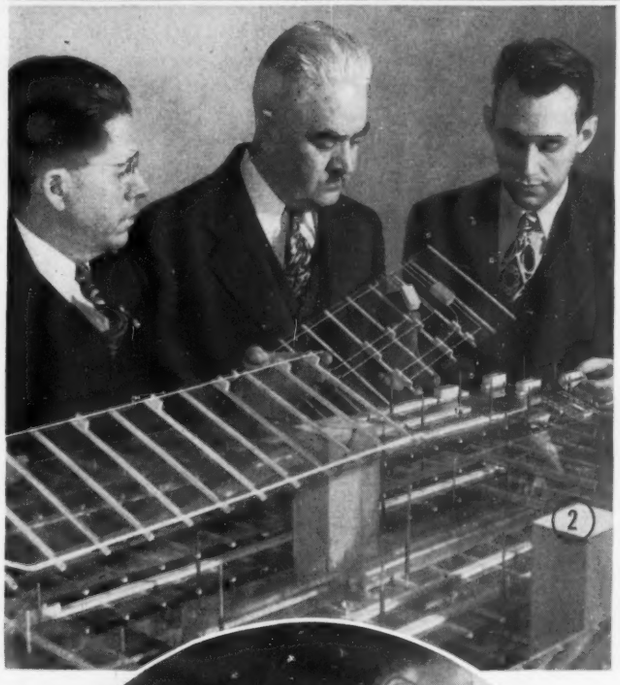
Fig. 7—Samples of shape and straight line cuts made with flux injection

Fig. 8—Flux-injection cut, upper right, on type 316 riser compared with carbon arc cut on same piece

Fig. 9—Essential equipment for flux-injection cutting is this portable, self-contained flux feeding unit

Miniature Auto Plant

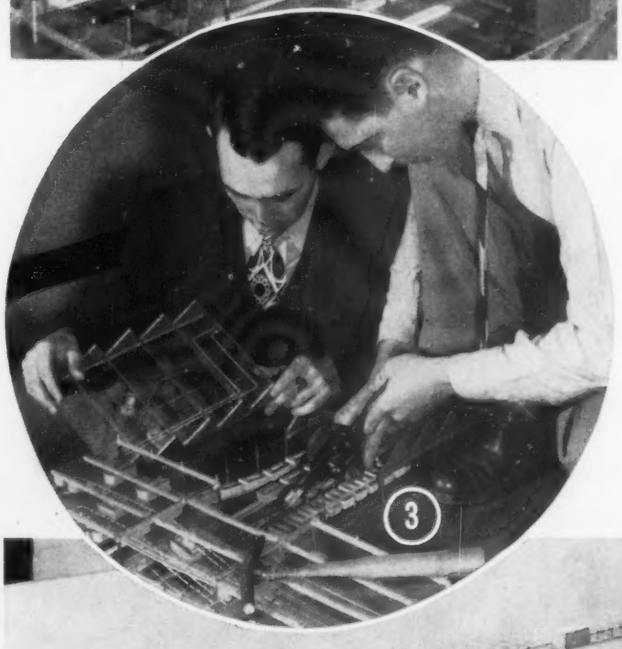
. . . aids engineers in analyzing production layouts

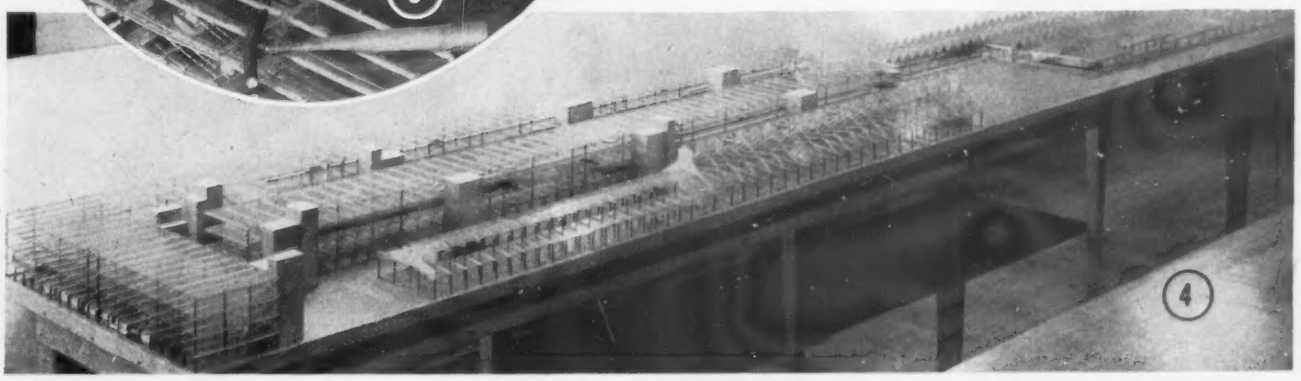


AS a part of an extensive $2 million modernization program at the plant of Lincoln Division of Ford Motor Co., Detroit, a three-dimensional model of manufacturing and assembly areas, covering about 16 acres under roof and 27 acres of floor areas, was constructed of 1/16-in. celluloid sheets, secured at each bay by strips of wood and supported by columns of ⅛-in. drill rod and tubing. Built to a scale of ⅛-in. to the foot, the model is designed to offer visual location of all machines, spray booths, ovens, overhead and floor conveyors and related equipment. Already the model has saved thousands of dollars by providing a more accurate analysis of operation sites than is possible in two-dimension form.

The complete model, shown in Fig. 4, rests on a table 26 ft 5 in. long by 3 ft 4 in. wide. Overhead monorail conveyors are of 1/16-in. soft wire painted in different colors to permit following the routing through the plant. Floor conveyors, such as chain, slat and buggy types, are of wood with contact reproductions glued on top to identify them. Body build-up bucks, equipment, bodies, frames, chassis and engines are represented in similar fashion. So successful has the undertaking proved that models will be constructed of the Metuchen, N. J., St. Louis and Los Angeles Lincoln-Mercury plants now under way.

Fig. 1 is a sectional closeup (*Please turn to Page* 126)





The WELDED Steel Press

Rigidity and lateral stiffness inherent in welded construction meets all requirements the author points out. Box-type columns of generous width hold crown and bed in line even under excessively eccentric loading. Trend in all press manufacture toward high-production efficiency

IN line with our present economy and the necessity of meeting higher production requirements than have previously been reached, punch press manufacturers are assuming their full share of responsibility. Punch presses are being manufactured that make possible higher rates of production at lower costs; presses that are more accurate, with greater rigidity so that die life is increased and die maintenance kept to minimum. These presses have less down time due to better design and workmanship and a more efficient system of factory service and interchangeable repair parts.

Standard lines of presses have been established by various manufacturers but there is less emphasis on the press user making the standard machine do his job. Special

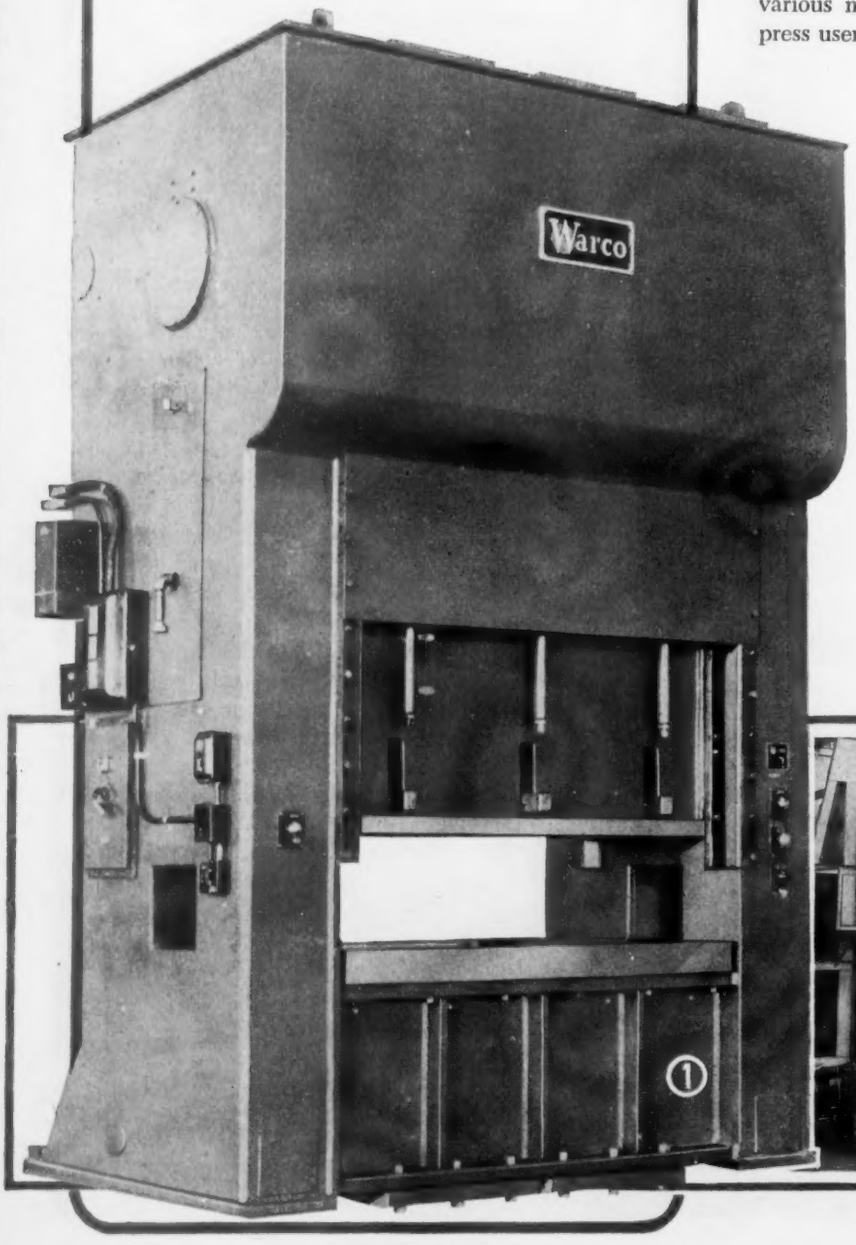
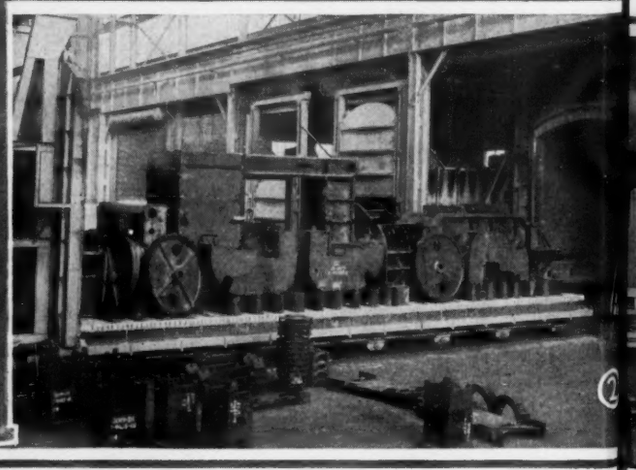


Fig. 1—Two-point eccentric gear press with rigid box-type press body and long bronze-lined gibs

Fig. 2—Essential components of a welded press mounted for the annealing furnace. All welded parts are "baked" to relieve locked up stresses which might otherwise contribute to misalignment from overload in service

Fig. 3—Press brakes like this 175-ton 10 ft by ¼-in. model are being used with multiple die setups for punching, perforating and shallow draw work requiring multiple operations. Limiting features are shortness of stroke and absence of die cushions

Fig. 4—Electrical fingertip or toetip control are valuable adjuncts to the smaller type O.B.I. press



types are being built. For instance, with the welded type of steel construction, it is feasible and practical to build presses to suit the press users' exact requirements.

Welded steel construction has also permitted box-shaped structures to be used for press bodies, giving clean, smooth lines to presses and also great rigidity and lateral stiffness. The lateral stiffness in box-type construction has allowed off-center loading to be used without excessive maintenance of the press and dies. Columns on presses of this box-type construction are very liberal in width, holding the crown rigidly in line with the bed even under an excessively eccentric loading. To further assist in off-center work, added attention is being given to the gibs. They are now longer and wider than formerly and are lined with renewable bronze liners for ease in replacing the wearing surface.

Effects of Deflection on Die Life: Press users have become cognizant of the effect of press deflection on die life. Numerous tests have been made and publicized on the relation of press deflection to die wear. The first of these was published in 1932 as a result of experiments made by the world's largest manufacturers of telephone equipment. Under close observation, this company ran one of their standard blanking dies in a steel frame press to see what the production would be per die grind. The results of these tests were surprising but not unusual. They showed that 50 per cent more parts per die grind were produced.

To further lessen the die maintenance problem, press manufacturers realize that a press is no longer a hammer for punching or forming steel, but a precision machine tool requiring expert workmen and modern machines for its production. Presses are being manufactured in modern, up-to-date plants equipped with the most modern machine tools in existence. These plants are light and airy and manned with skilled operators working under almost perfect working conditions.

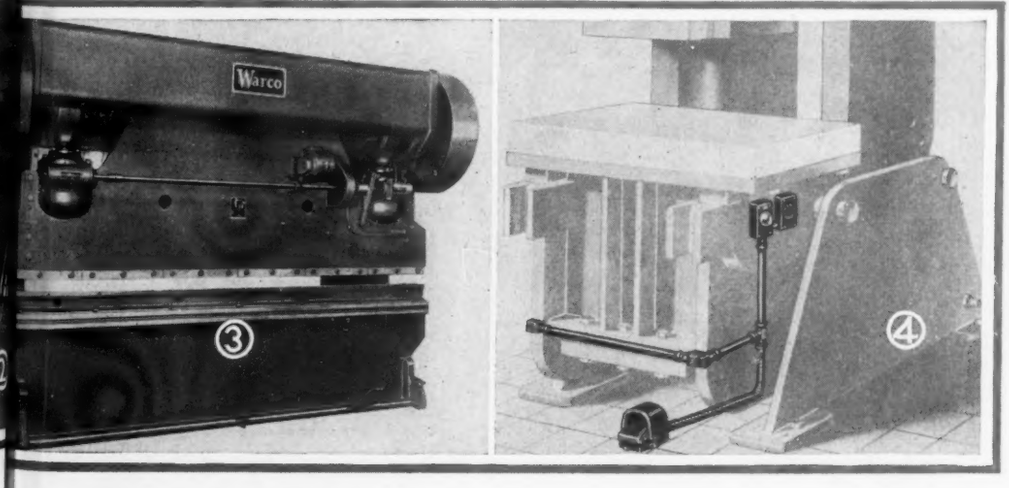
Press manufacturers are looking forward to an era calling for more and more accuracy and rigidity in their machines and also calling for simplification of presses, and yet the building of special presses for a specific job. Many means are employed by production departments to take advantage of the special presses and feeds offered by the manufacturers.

Progressive Die Setups: These are being used for performing progressive operations on a part, thus producing a finished part, or a part on which numerous operations have been performed. At each stroke of the machine a finished part is produced. In most cases an automatic double-roll feed, feeds the stock into the press and the part being produced is carried from die to die in the stock until the last operation where it is blanked from the stock or sheared from the scrap. Coil cradles are being used to hold a coil of stock and feed it to the roll feed. Roller-levelers, scrap cutters, and stock oilers are used where desirable to further mechanize the press operation. In many shops one press operator has two or more machines to operate.

Transfer Feed Presses: For deep drawn parts and other parts that do not lend themselves to feeding from die to die held in the stock, transfer feed presses having multiple die set-ups are being constructed. In this type of machine, coil stock is fed into the machine at the first die position. From this die position the part is carried progressively from die to die by an automatic feed built as part of the press. It is not feasible to add this type of feed to an existing press. Rather, it must be part of the press design. In some cases, in order to take advantage of nesting blanks, parts are blanked separately and then are fed into the first die with the use of a stack or magazine feed, and the transfer feed then carries the part through the other die positions. This type of machine is suitable for producing parts in great production only. It is not suitable for short runs.

With the use of a progressive die set-up or a transfer feed set-up it has been possible to eliminate an annealing operation that was sometimes found necessary when the various operations were done in separate presses. There is less tendency for the material to work-harden when the operations are performed progressively over a short period of time.

Where it is not possible to automatically feed parts from die to die in the same machine, multiple die set-ups have been made in presses so the parts can be fed from die to die manually. In this type of machine one or more operators are required, but a completed part is produced with each stroke of the press without handling or storage problems between operations. In most cases this type of work demands wider machines and machines capable of taking off-center loading without ill effects. The machines must be very rigid vertically and laterally and the gibs must be ample in size (*Please turn to Page* 112)



By ALBERT CLEMENTS
Chief Engineer
Warren City Mfg. Co.
Warren, O.

NEW Enameling

QUALITY of baked enamel finish on cars is controlled by means of new direct-fired ovens and a continuous conveyor system at Dodge division of Chrysler Corp., Detroit. Representing a 9-month development program, the new installation occupies three floors of a hollow square in the huge main plant.

Bodies start on the sixth floor with an alkalizing wash and Bonderizing, followed by a trip through dry-off ovens, primer spray, primer bake, wet-sanding and another dry-off oven. Three conveyor lines circle the sixth floor. On completing the circuit, bodies are lowered to the floor below, Fig. 2. Fifth floor operations include inspection, application of the sealer coat spray, passing through the sealer ovens, followed by wet sanding of the sealer coat and dry-off in the dry-off ovens. On the fourth

g System

Cuts oven travel-time 50 per cent for Dodge in applying better auto body finishes

floor, bodies go through a clean-up department, finish spray, finish baking and finish inspection.

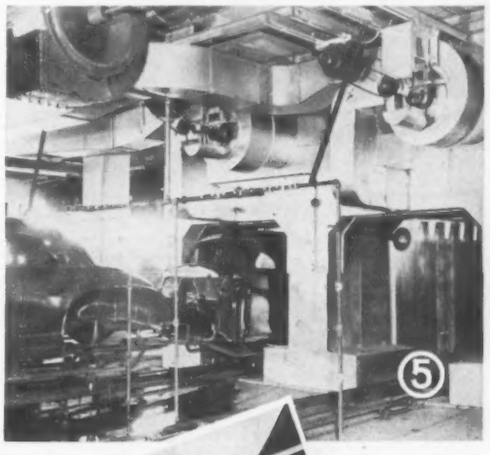
Heart of the new system is the flexibility of the ovens, achieved by dividing them into zones. For example, there is a heating zone to bring bodies rapidly up to baking temperature; one or more holding zones, and an exit zone. Each zone is 35 ft long. Each has its own gas heater and fan unit, mounted on top of the oven, and its own set of fully automatic controls.

Supply and return ducts for heated air are built into the roof of the oven, keeping the walls and floor clean. Forced draft heated air enters the tops of the ovens through two rows of nozzles along the two sides of the oven top. The nozzles increase the turbulence of air within the oven. They activate the oven air around them, mixing it with the air passing through them and putting the whole mass in motion. Actual movement of air within the new ovens may be six to 25 times as great as in the ovens used by Dodge before the war.

This rapidly moving heated air rolls downward along the oven sides to the floor, rolls inward toward the center of the floor and returns upward through and around the bodies, leaving the oven through a row of controlled openings, Fig. 1, in the top center of the oven, to be reheated and recirculated. Turbulence within the oven completely envelopes the car bodies in heated air of uniform temperature.

Temperature tests are run by attaching thermocouples to the two sides, top and bottom of a body passing through the ovens. These show that the bottom, which once was the last to heat, now comes to temperature first, the sides next and the top last, and that all sections of the body are at almost identical baking temperatures during the baking period, with less than 5° variation from top to bottom of oven.

Recirculation of heated air is one of the secrets of the efficiency of the new ovens. Since both ends of the ovens are open, with conveyor lines moving through them, a new air seal has been provided to prevent loss of recirculated air from the ends of the ovens. This air seal at the oven ends is accomplished by means of fans in the roof at the oven ends which circulate air (*Please turn to Page* 128)



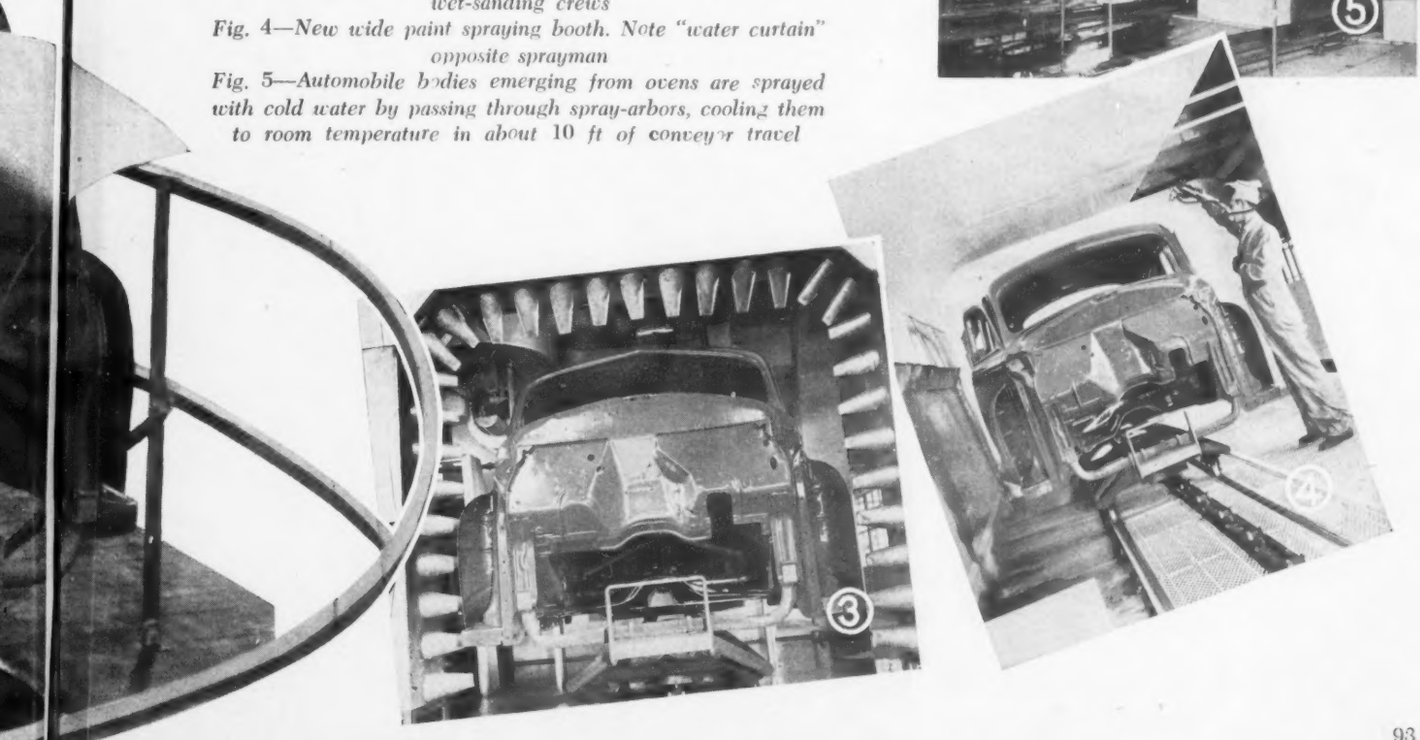


Fig. 1—Empty oven showing duct arrangement for forced draft circulation of air

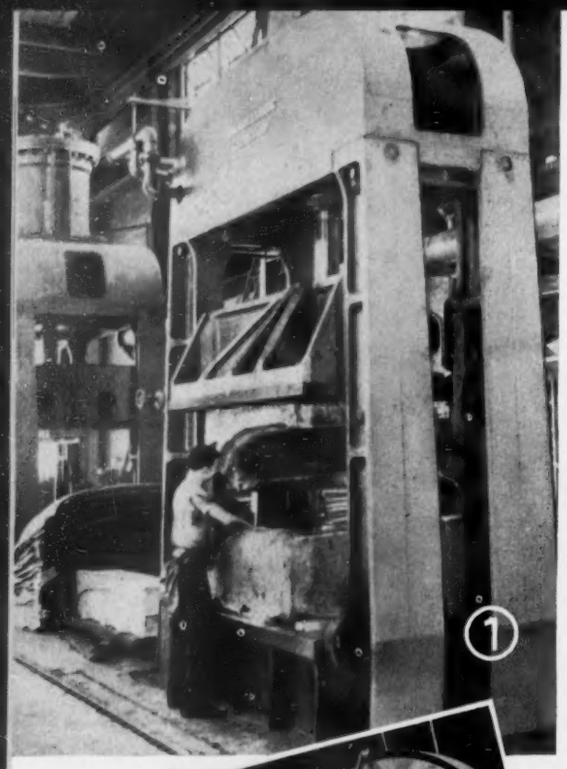
Fig. 2—Continuous conveyors in new Dodge paint department circle each floor and progress downward from sixth floor to the fourth

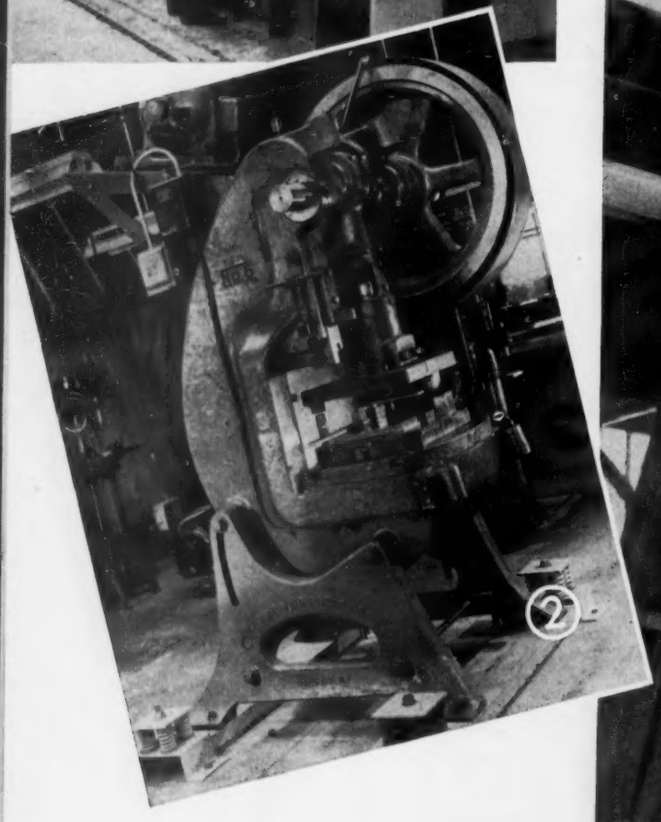
Fig. 3—After passing through water spray, bodies move through arbor of air jets for quick cool-down from temperatures as high as 325° F to room temperature, ready for inspection and wet-sanding crews

Fig. 4—New wide paint spraying booth. Note "water curtain" opposite sprayman

Fig. 5—Automobile bodies emerging from ovens are sprayed with cold water by passing through spray-arbors, cooling them to room temperature in about 10 ft of conveyor travel

CONTROL OF





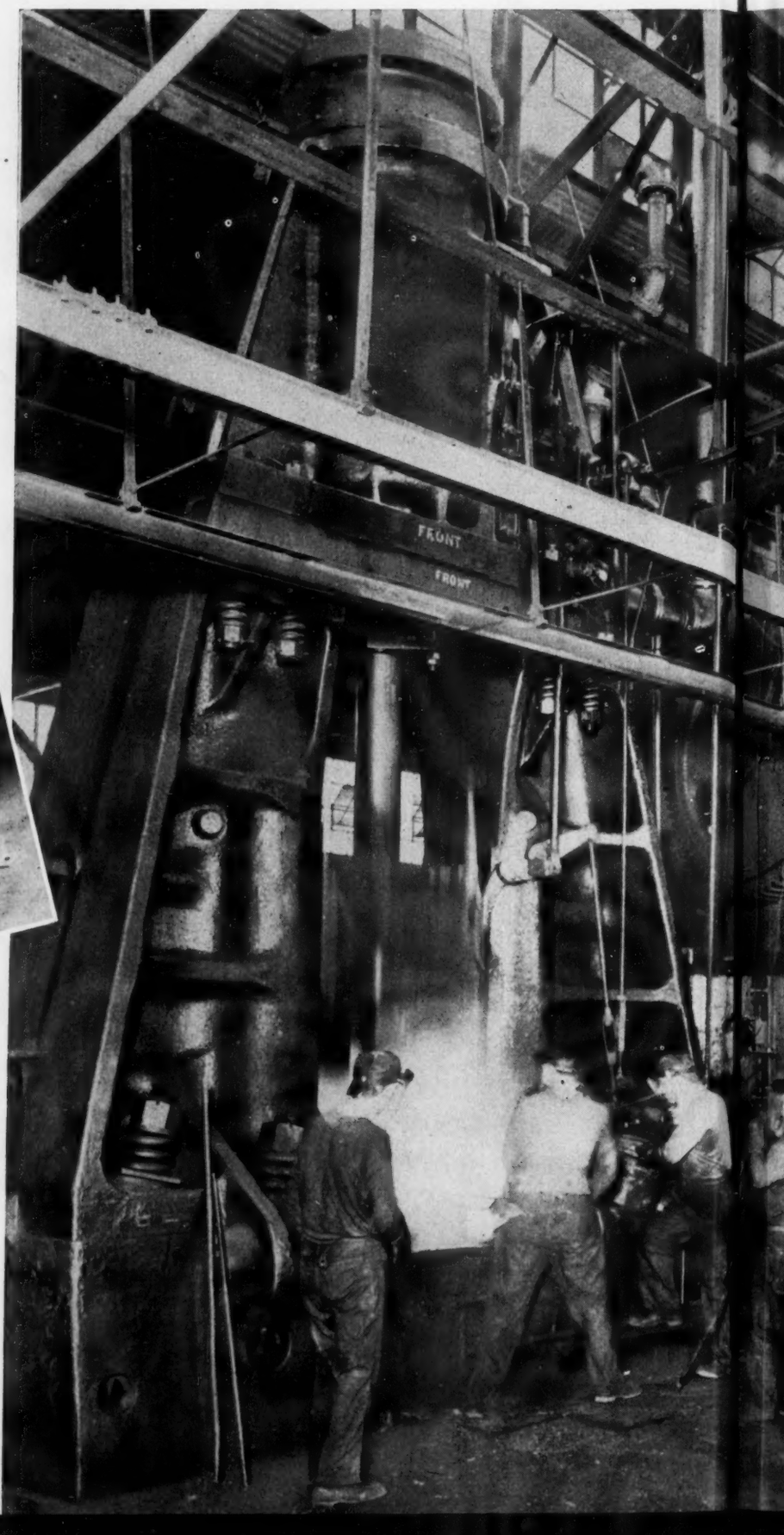


Fig. 1—Presses at A. C. F. Brill Motor Co., Philadelphia, mounted on Fabreeka pads

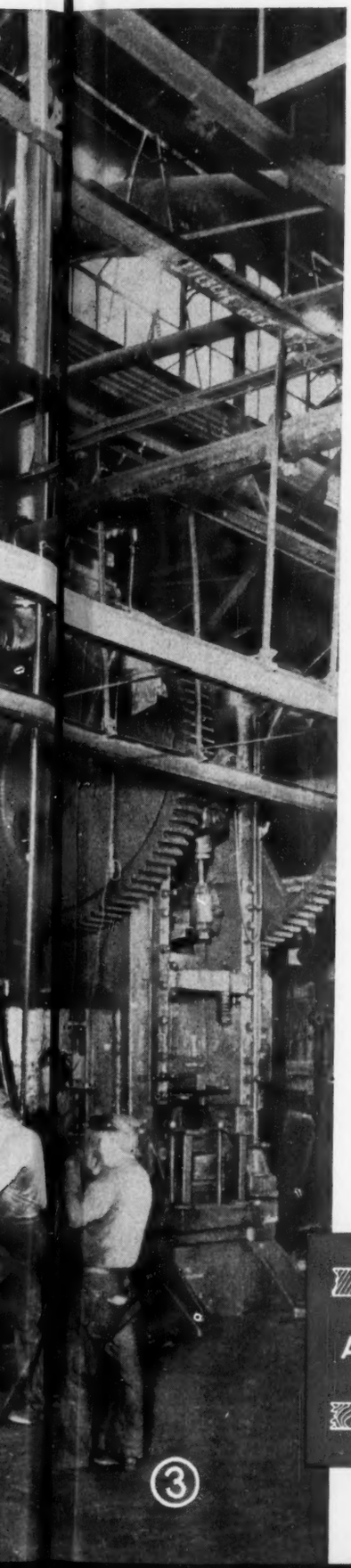
Fig. 2—Suspension type mountings on a punch press (Carl Hussman, Engineers)

Fig. 3—Forging hammers isolated with Fabreeka pads

Fig. 4—Methods of installing felt to prevent sidewise motion of the isolated machine (American Felt Co.)

By JOHN PARINA JR.
Associate Editor, STEEL

VIBRATION CAN Increase Production Efficiency



Until recently vibration was accepted by some plants as an evil which accompanied high speed production processes and over which there was little control. However, measures for its control have been constantly improved over the years and are being used more extensively. In this series of articles the various available materials are described and standard methods of their application are indicated

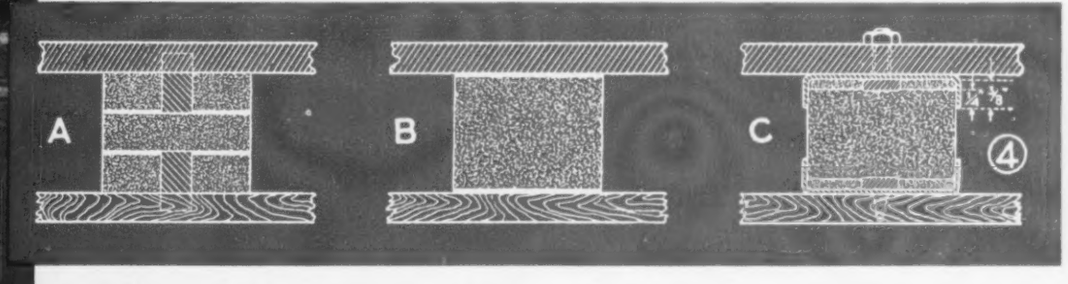
UNCONTROLLED vibration in industrial plants is too often the undetected or ignored economic leak in otherwise efficient output of men and machines.

It can affect machine life, maintenance of buildings, efficiency of operation, accuracy and machine output. Nor need the vibration be of the magnitude normally encountered with impact machinery before its effects are noticeable; a relatively quiet operating motor can be the source of vibration that is severe enough to have a detrimental influence on the accuracy of precision instruments and machinery.

Furthermore, vibration, either in itself or when it manifests itself as noise, impairs the health and efficiency of workers. Nervous ills, headaches and fatigue often result and such ailments not only decrease worker efficiency but also increase accidents and absenteeism.

There are two general methods of controlling vibration: Its causes may be eliminated or diminished through improved design of those points which act as origins, i.e., couplings; unbalanced rotating and reciprocating parts, inadequately cushioned areas of impact, etc.; or, the source (either the components of the machine or the machine itself) may be isolated by means of resilient or antivibration materials and thus reduce the transmission of vibration. This article will discuss the latter method of control.

The method is easy to use. Essentially, in many cases it involves nothing more than determining the frequency of the disturbing force (the vibration of the machine) and the frequency of the isolator, and then substituting these values in a simple equation. This, plus the use of graphs, gives the solution to most problems. However, it should be stated that although this method is as much an exact formula as it is a general approach, it should be remembered that a general rule is applicable to the majority of cases but not to every case. Therefore, this article should be considered as



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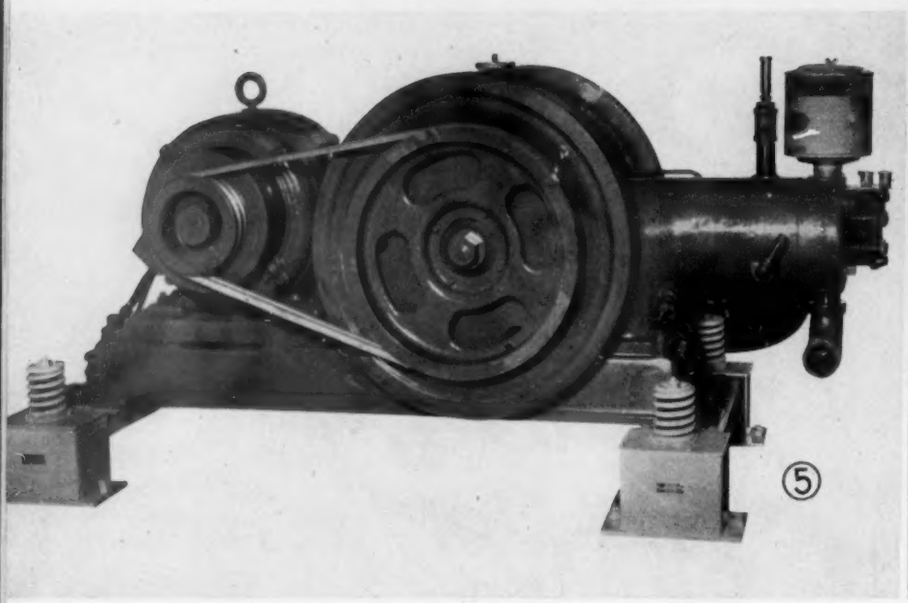


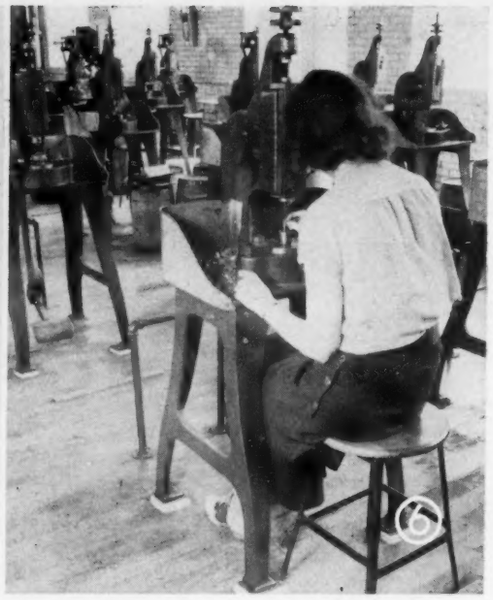


Fig. 5—Type C spring mountings on a horizontal diesel-electric plant (Carl Hussman, Engineers)

Fig. 6—Side thrust caused by pedal operation of kick press is cushioned by felt mounting pads, reducing muscular fatigue (Felt Association)

offering a means to an end and not as a blanket recommendation for a way of solving every type of problem.

Vibration can be defined as a type of motion in which the moving object moves back and forth repeatedly over the same path. A simple example of this is the vertical oscillating action of a weight suspended by a coiled spring, or the quivering motion of fork prongs which results from a sharp blow. Inasmuch as the motion repeats itself after an interval of time called the period of the vibration, it is known as periodic motion.

Simplest kind of periodic motion is harmonic motion. This type of motion can perhaps be best explained by considering that the weight suspended by a spring is a vibrating body in no way differing in principle from that of a vibrating machine. When a force is applied to stretch the spring, a restoring force (an equal force acting in the opposite direction) is set up within it and this causes the spring to pull the weight up when it is released.

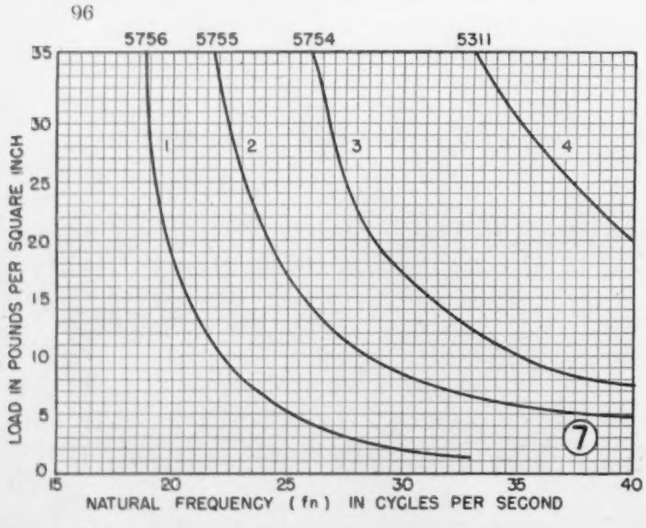
The harmonic motion of one vibrating mechanism may differ considerably from the harmonic motion of another vibrating mechanism. Differences in the values of the fundamental properties of vibratory motion are described by such terms as amplitude, frequency period, etc. The "displacement" of a body in vibratory motion at any instant is its distance from the midposition at a given instant; "amplitude" of a vibration is the maximum displacement. The "periodic time" or "period" is the time interval, usually measured in seconds, during which a body completes one vibration, i.e., the vibrating body makes a complete cycle. "Frequency", measured in cycles per second, is used to denote the number of vibrations completed in 1 sec.

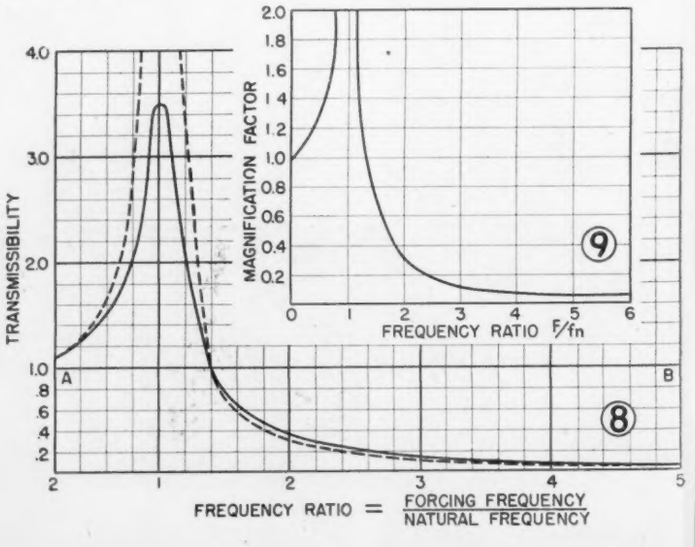
For our purpose, vibrations may be considered to consist of two parts, free damped vibrations and forced vibrations. Free damped vibrations are nothing more than the vibrations already considered except that instead of being unaffected by any external force, such forces as air resistance, internal friction of the vibrating material, friction between sliding surfaces, etc., are always present and act as sources of damping forces. Forced vibrations are the result of a periodic disturbing force acting on the vibrating body and exist

Fig. 7—Loading curves for the natural frequency of various felt materials (American Felt Co.)

Fig. 8—Transmissibility or magnification factor is indicated by the dotted line, solid line is for Fabreeka pads (damping ratio 1.60)

Fig. 9—Vibration and transmitted force as a function of frequency ratio





Yes, there are lots of reasons why women really go for clothespins like this, made from gleaming Carpenter Stainless.

These pins really hold tight, keep the clothes on the line. No more split or broken pins . . . no more splinters to damage her pet pair of nylons. Plus the fact that Stainless always stays clean!

From your own standpoint, this story of Stainless clothespins shows how you can give your products the utility and sales appeal that come with Carpenter Stainless. And you can do it equally well if your product is in the luxury class . . . or if it sells for less than a dime. (These clothespins retail for only 30c a dozen!) Ever since the days when the first Free-Machining Stainless bars and bright ductile Strip were developed in Carpenter's laboratory, we have been helping Stainless users "turn it out faster and at less cost". To put our experience to work, drop us a line.

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Strength
Rigidity
Heat Resistance
Corrosion Resistance
Longer Product Life
Sales Appeal

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wherever there are moving parts in machines. These moving parts create periodic forces of definite frequencies and the resulting vibration thus originated is known as sustained or "forced" vibration.

The frequency of vibration of the body subjected to a continuously acting periodic force will be that of the disturbing force. Therefore, if vibration is to be minimized, forced vibrations must be brought under control.

An understanding of the theory of the functioning of flexible mountings in controlling forced vibrations is helpful in obtaining vibration control by the use of isolators. Vibratory forces are transmitted directly from the body generating the forces to the supporting foundation if the two are rigidly attached. However, if the same vibratory force, or forces, could be made to appear in a body that is completely free in space, the force would then be resisted solely by the inertia of the body and the body would vibrate only slightly. In practice this free condition in space is approximated by placing the body on resilient mountings. The mountings however must be sufficiently flexible in order that the vibratory forces are resisted by the inertia of the body and thus reduce the oscillatory motion of the body.

Although a considerable portion of the vibration of the mechanism is absorbed by the mountings, small forces (which are a portion of the original vibratory force acting on the body) are present and act on the supporting structure. This portion is a function of the ratio between the disturbing frequency and the natural frequency of the isolated system; effectiveness of the resilient mounting can therefore be determined from this relationship which is expressed mathematically as:

$$\text{Transmissibility} = \frac{1}{\left(\frac{F}{f_n}\right)^2 - 1}$$

where F is the disturbing frequency and f_n is the natural frequency of the mounted machine. Solution of the formula will give the portion of the vibratory force transmitted as compared to that if a solid support was used.

For effective isolation of vibration the ratio between disturbing frequency and natural frequency must be greater than $\sqrt{2}$. The system becomes progressively more efficient as the ratio assumes values greater than $\sqrt{2}$; as the ratio of F f_n becomes smaller than $\sqrt{2}$, magnification of the forces will occur. When the two frequencies are the same a condition of resonance will exist. This condition must be avoided because at resonance the amplitude of the vibration that is transmitted to the foundation is greatly magnified. This condition is graphically presented in Fig. 9 which depicts vibration and transmitted force as a function of frequency ratio. Another precaution that should be observed is to make certain that the forcing frequency is not near the natural frequency because if the former is close to the natural frequency, whether a little above or a little below, the transmitted amplitude will be greater than if no isolators are used. According to Fig. 9 therefore, successful reduction of transmitted vibration is realized when the natural frequency of the machine mounted on its resilient isolators is less than one-half and preferably one-third of the rate of the forcing frequency.

At a ratio of 2:1, it is possible to obtain approximately 66 per cent efficiency, while at a ratio of 4:1, an isolation efficiency of about 93 per cent is realized. Now since frequency ratio is simply the forcing frequency divided by the natural frequency, and the efficiency of these various ratios has been classified, it is possible to select a standard isolator that will meet the requirements of the job in the majority of the cases by choosing the degree of vibration absorption which best fits the problem under consideration and then completing the formula so that the result will be a frequency ratio that gives the desired isolation efficiency.

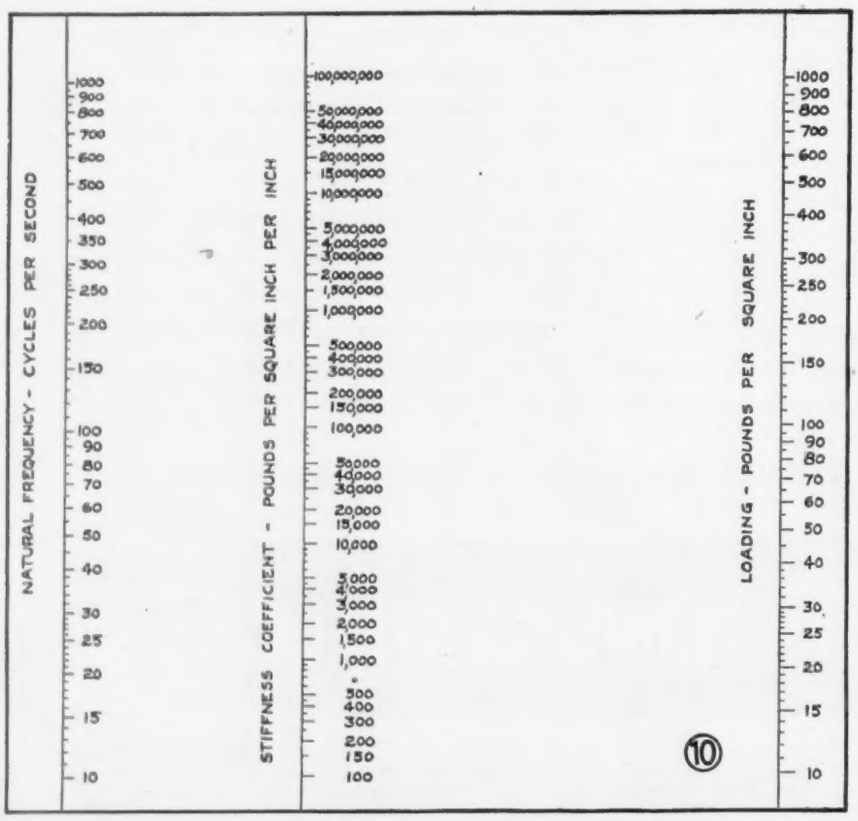
The formula is completed by determining the natural frequency of the isolator and the disturbing frequency of the equipment in the following manner: The disturbing frequency of the equipment is usually the operating frequency of greatest amplitude and this can be found from the number of revolutions completed within a minute, or the number of impacts per minute. Thus, if one reciprocating movement takes place during a revolution of a shaft, then the forced frequency of vibration per minute is the same as the revolutions per minute of the shaft. Therefore, two reciprocating movements for each shaft revolution would produce a forced frequency that is twice the shaft rpm. In this manner the number of cylinders in some types of machines can be used to determine the disturbing frequency. The natural frequency of the isolator depends on its deflection under static load and this frequency can be readily found from the formula that expresses this relationship. The formula:

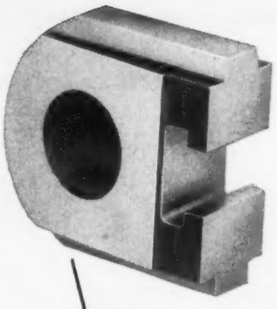
$$f_n = \frac{60}{2}\sqrt{\frac{g}{d}} \text{ or } \frac{187.6}{\sqrt{d}}$$

determines this natural frequency of simple linear vibration of the isolator where f_n is the natural frequency of the

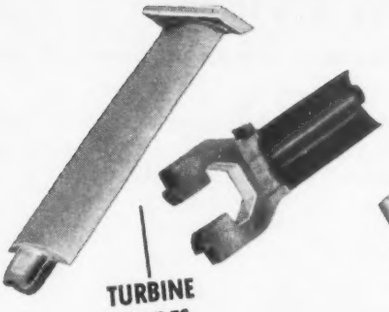
(*Please turn to Page* 118)

Fig. 10—Nomograph which can be used to determine the proper mountings to reduce transmission (Fabreeka Products Co.)

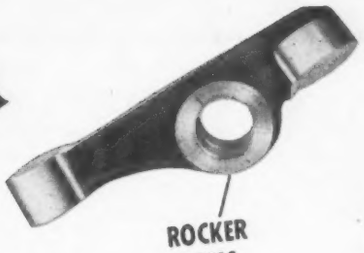




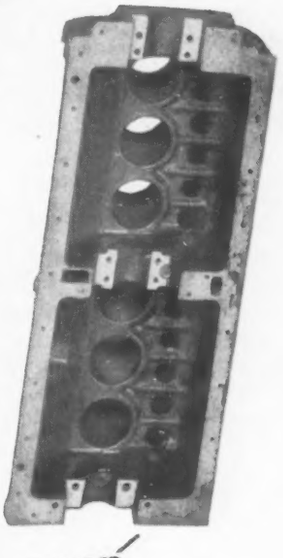
GATE VALVES



TURBINE BLADES



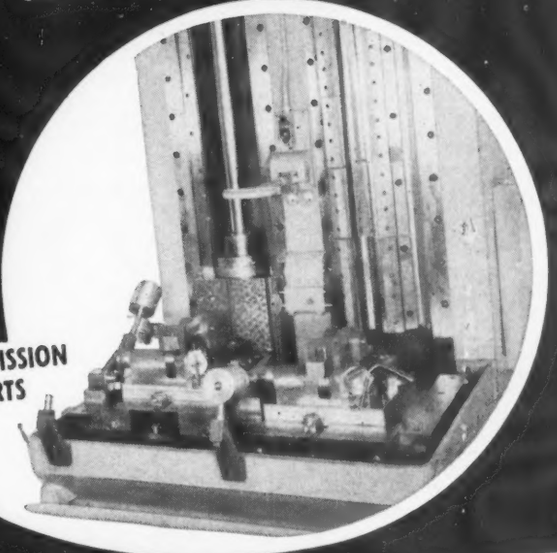
ROCKER ARMS



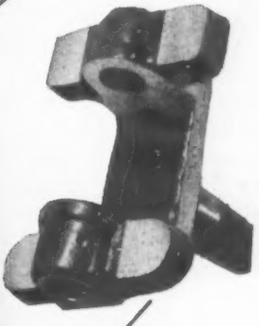
CYLINDER BLOCKS

CIRCUIT BREAKERS

Machining parts like these is duck soup for



TRANSMISSION PARTS



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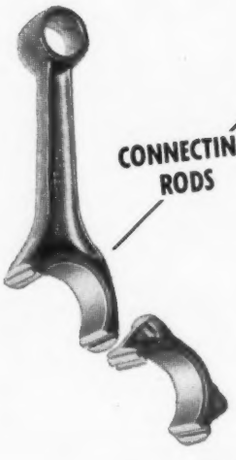

CONNECTING RODS

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Broaches — Broaching Machines - Broaching Equipment

Engineering News *at a Glance*

HEAT BY INFRARED RAYS: New 5½-pound 1250-watt portable home heater currently produced by the Emeryville, Calif. plant of Westinghouse Electric Corp., provides immediate heat by radiation of infrared rays, then helps maintain the desired room temperature by convection. Cool air enters at the bottom of the aluminum heater and flows upward over both the inner and outer surfaces of a vertical semicylindrical heating element. Latter consists of nickel-chromium wire supported on the outside of a ceramic post. Air circulation is augmented by scientific design of both unit proper and the heating element.

STANDS HIGH TEMPERATURES: Porcelain and Pottery Laboratory at the National Bureau of Standards, Washington, reports development of new all-crystalline porcelains of exceptional mechanical and dielectric strength at temperatures extending up to 2000° F. Composition of the porcelains is characterized by the use of such materials as alumina, beryllia, zirconia and thoria with minor additions of other metallic oxides, and by the absence of silica. A representative high-beryllia porcelain, the lab states, contains 84 per cent beryllia and 8 per cent zirconia with small amounts of lime and alumina; a typical high-zirconia composition is 80 per cent zirconia, 10 per cent beryllia and 10 per cent magnesia. The porcelains are particularly valuable for sustaining loads at elevated temperatures, and as insulators for special applications as aviation spark plugs and radar transformers.

SIDING TO PRESS EXISTENCE: Among reasons for ups and downs of the steel industry is it reflects the fluctuations of other industries it supplies. A case in point is the auto situation. In good years some models attract many orders, and automobile companies hustle requests for steel. During a bad year steel orders are reduced. According to *Steelways*, published by American Iron and Steel Institute, the situation cannot be smoothed out by "spread-out" deliveries and storage in bad years. Stocks of sheets for car tops and fenders cannot be built up in advance and stored. Acres of warehouses are required to store sheets for only one maker. A warehouse with 50,000-ton capacty, large enough to store only two or three weeks' output of one large mill, would be several blocks long. It could be no shed—but a well-built and heated building. Furthermore, deep-drawing steel for car bodies must be used soon or it is likely to develop surface disturbances—"stretcher strains"—when it is placed in metal forming presses. Although this effect may be prevented by roller-leveling the stored sheets just before use, the process, added to the cost of handling, would add about $3 more to the buyer's bill. Thus auto makers for the most part live from railroad siding to steel press in a hand-to-mouth fashion.

STEEL WIRE RECORDING: Sound is recorded magnetically on stainless steel wire on two improved dictating and transcribing machines now in production at the plant of Pierce Wire-Recorder Corp., Evanston, Ill. It is picked up on the wire, used in form of spools, through one "mike" or a mixer controlling four "mikes." Because there is no mechanical contact, the machine records silently and the message may be played back 100,000 times without wear or loss of tone quality. In addition sound can be "erased"" automatically with or without new dictation over the same portion of the fine wire.

UP TO THE CHEMIST: F. M. Clark, General Electric insulation expert, in an American Chemical Society sponsored tour of several southern cities, revealed that electrical insulation, originally a problem of the engineer and physicist, now is in the hands of the chemist, and must be solved by him if electrical progress is to continue. He pointed out that electrical development and application now is at a point where better insulation is necessary so that development will not be slowed. Many insulations in use today, he said, are among the first developed.

SOLVES CLEANING PROBLEM: Application of a special power-brushing technique recently solved the problem of cleaning loose particles of metal and sand from the interiors of large castings used for rear axle housing and differential carriers of motor trucks, White Motor Co., Cleveland, reports. The technique eliminates possibility of loose particles injuring gears and bearings after the trucks are placed in operation. Cleaning operation is completed prior to processing the castings through the washing with a lacquer heat-resisting sealer. Three operators, equipped with disk center wire cup and end brushes made by Osborn Mfg. Co., Cleveland, clean the castings at the rate of five per man each hour. Front wheel hubs also are cleaned in this manner. The brushes are mounted on electrically-driven hand tools.

FIRE-ARRESTING STEEL: In New York, it was learned American Flange & Mfg. Co. is again making available its steel insulation, a material a little thicker than a postcard, measurinig 0.006-in. During the war, it was used in PT boats, Army and Navy altitude test chambers and in hospitals. The material, in spite of its diminutive thickness is fire-arresting, cannot be penetrated by rodents, termites or insects and does not absorb odors or moisture. As a fire-resistant agent, it forms a protective shield that forces back the flame, withstanding temperatures above 1000° F. As insulation, it keeps buildings cool in the summer and saves fuel in the winter. It is recognized as a major space saver in the refrigeration field, weighing 0.25 lb per square foot.

SURFACE HARDENS STAINLESS: In Indian Orchard, Mass., it was learned, Chapman Valve Mfg. Co., recently made a contribution to industry in the surface hardening of stainless steels by the addition of nitrogen to the outer portion of the steel. The process developed by the company is called Malcomizing. It is one that takes advantage of the chromium in the various grades of stainless as the hardening element to form a hard, wear-resistant surface without seriously affecting the corrosion resisting characteristics of the steel. Low temperature used in the treatment also serves to keep dimensional changes at a minimum. According to the company, the treated steel will show a minimum hardness of 92 superficial rockwell, 15 N scale, which corresponds to a vickers hardness of 820 brinell, although the average is nearer 1000 vickers. Maximum hardness is found several thousandths of an inch below the surface. This allows for finish grinding and lapping. Depth of case produced varies with type of stainless steel used.

MECHANIZED FOR EFFICIENCY: Built from the ground up during the war to make armor-piercing shot and HE shell, the privately engineered and managed ordnance plant of W. F. and John Barnes Co. at Rockford, Ill., achieved maximum production at the lowest cost per shell. According to "Powerfax," the

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ADVANTAGES

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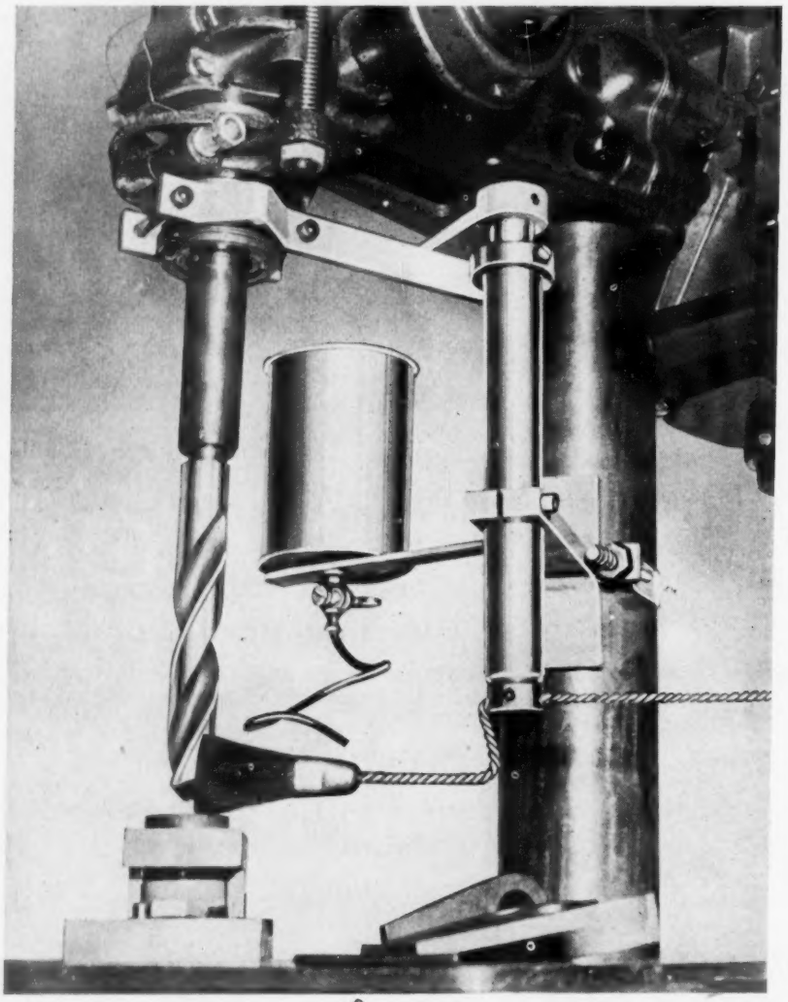
plant was highly mechanized, everything being handled automatically, including the disposition of chips and turnings. Both chips and coolant fluid, for example, passed through chutes in the floor to a chip and cooling conveying system operating in tunnels under the machine shop floor. All apron conveyor pans were fitted with screens to let the coolant drain into a settling tank, from which it was pumped through strainers for cleaning and subsequent return to the various shell-turning machines.

EXPANDS SALVAGING ACTIVITIES: In Detroit, it was learned, National Tool Salvage Co. recently expanded its department for salvaging tungsten carbide-tipped cutters. Improved facilities, together with the addition of more specialists in this type of work, places the company in a position to accept work in any quantity that involves most types of salvaging, from the resharpening of cutters or replacement of a broken tip to the complete alteration of cutters for other operations.

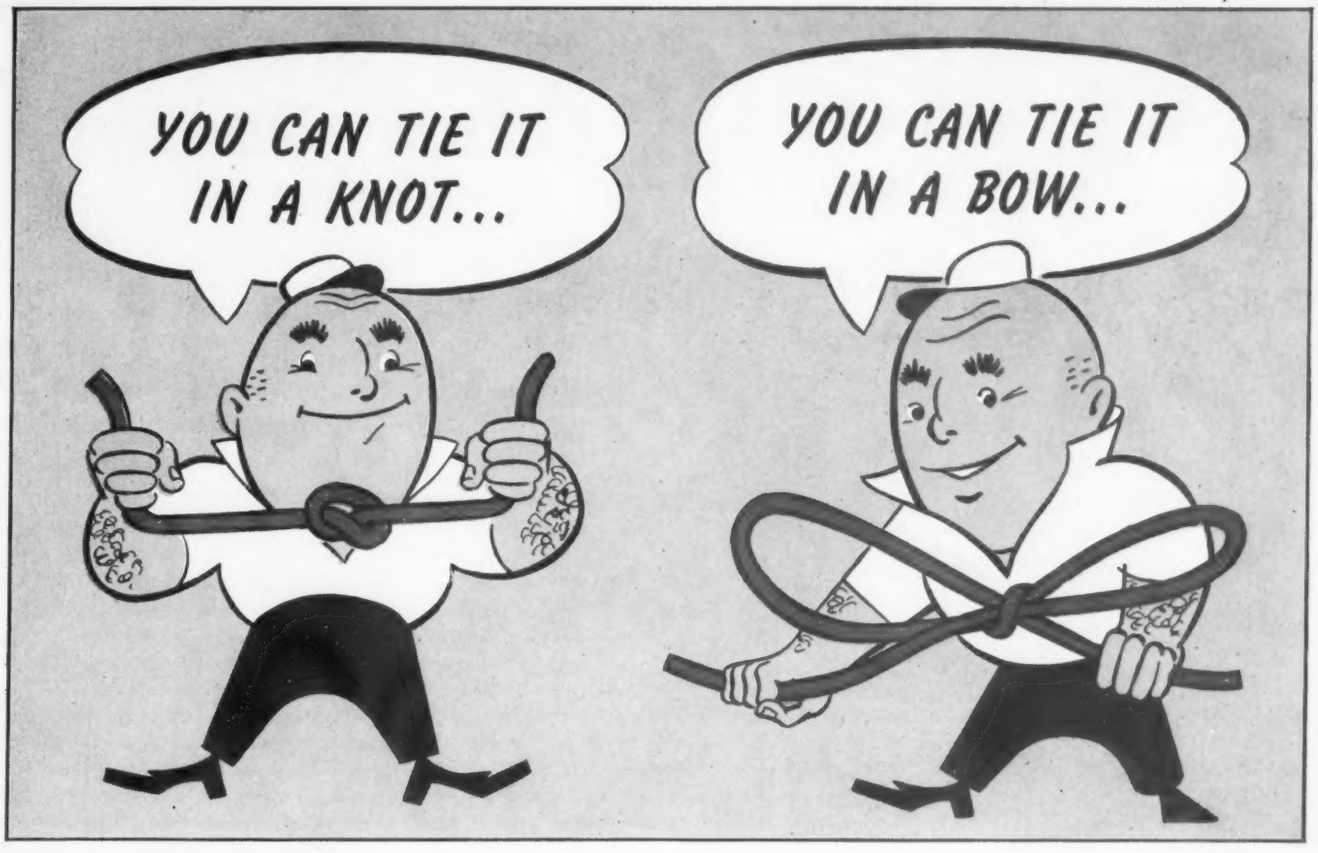
HEAT TREATING SHUFFLE: Problem of eliminating production delays caused by the necessity of heat treating various aluminum alloys for different time periods, was solved recently for Glenn L. Martin Co., Baltimore, by a suggestion made by an employee, J. Edwin Burkhardt. The suggestion saves at least 40 hours of furnace time each week, and eliminates the need for using other furnaces. Under the old method, four aluminum alloys were aged at two different time periods; 14S and R-301 were aged together at 350° for 6 hours, while 53S and 61S were aged at the same temperature for 8 hours. This delayed rush jobs, due to the different aging periods. If the first two alloys were already in the furnace, the second two by necessity were placed in an engine mount furnace, rivet or wood shop furnace whichever was available. Under the new method, the four alloys simply are aged together at 350° for 8 hours, or 340° for 10 hours. The 10 hour treatment permits the shop to age the material during the interval between second and first shift; the second shift can put it in the furnace, the heat can be run while no one is working, and the day shift can take it out. Either time cycle eliminates tieups.



DOUBLE FUNCTION: One way to simultaneously lubricate and brush a tap, reamer, drill or countersink in action is advanced by Charles L. Jarvis Co., Middletown, Conn., in form of the automatic device shown in accompanying illustration. The development, called the Lubro brush, can be installed and working in a matter of a few minutes. According to Jarvis, it fits any standard press, and is readily adaptable to other equipment such as punch presses, small lathes and hand millers. Simple cam action of the device transmits a short lift stroke into a sweeping action of the brush. Lubricating device may be seen in the center above

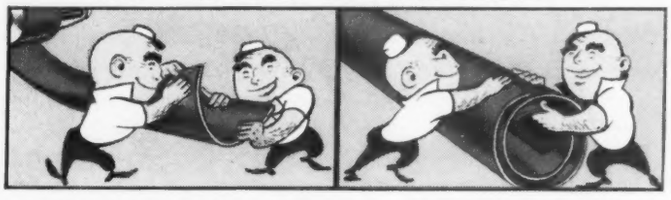
ATOM DETECTIVE: One atom of antimony among fifty or a hundred thousand atoms of lead is readily detected by the spectrograph as a phony nickel is found by a drugstore telephone in the laboratory of Gould Storage Battery Corp., it was learned recently. Here, an electric spark instead of a flame is used to excite the atoms of the element being analyzed. The band of light rays produced by the spark against the metal sample is photographed, and the photo is projected on a screen for examination. Each line shown on the screen belongs to a specific element, and the intensity of the line indicates the amount of the element present. Thus, with emission spectrography, it is possible not only to tell what elements are present in a given material, but also how much.

"CAPTURES" SHOCK GEES: A device that measures accelerations up to 8000 times gravitational acceleration at frequencies up to 10,000 cycles per second is being used to aid shock testing engineers in detecting ultra-high, split-second movement at Westinghouse. Helping them with the problem is a compact crystal accelerometer that makes use of the pieze-electric phenomena found in quartz crystals. A change in force on the crystal surfaces causes a charge to appear on them. Amount of charge is directly proportional to the change in force exerted on the crystals and, therefore to the acceleration. Since the small charge generated is easily lost, a sensitive voltage detector system is employed as well as an oscillograph, the latter reproducing the acceleration record. It is pointed out that a turbine when vibrating badly may experience accelerations of only 15 g.



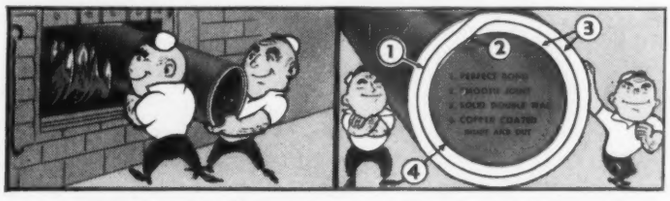
Bundyweld Steel Tubing Fabricates With Ease

WHY BUNDYWELD IS BETTER TUBING



1 Bundyweld Steel Tubing is made by a process entirely different from that used in making other tubing. A single strip of copper-coated S.A.E. 1010 steel is continuously rolled twice laterally . . .

2 . . . into tubular form. Walls of uniform thickness and concentricity are assured by the use of close tolerance cold rolled strip. This double rolled strip passes through a furnace where the . . .



3 . . . copper coating fuses and alloys with the double steel walls. After brazing and cooling, it becomes a solid double wall steel tube, copper brazed throughout 360° of wall contact . . .

4 . . . copper coated inside and out, free from scale, closely held to dimensions. Hard or annealed in standard sizes up to ⅝" O.D. Special sizes cold drawn. Also in Monel, nickel and nickel alloys.

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You save precious time in production, because this modern tubing fabricates with ease. And you gain in dependability, because of the strength imparted by Bundyweld's unique solid, double-wall construction. Bundyweld meets three vital tubing needs:

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Every working day, nearly two million feet of Bundyweld Steel Tubing roll out of our plant to become vital parts in motor vehicles, cooling equipment, gas ranges and other items of modern industry.

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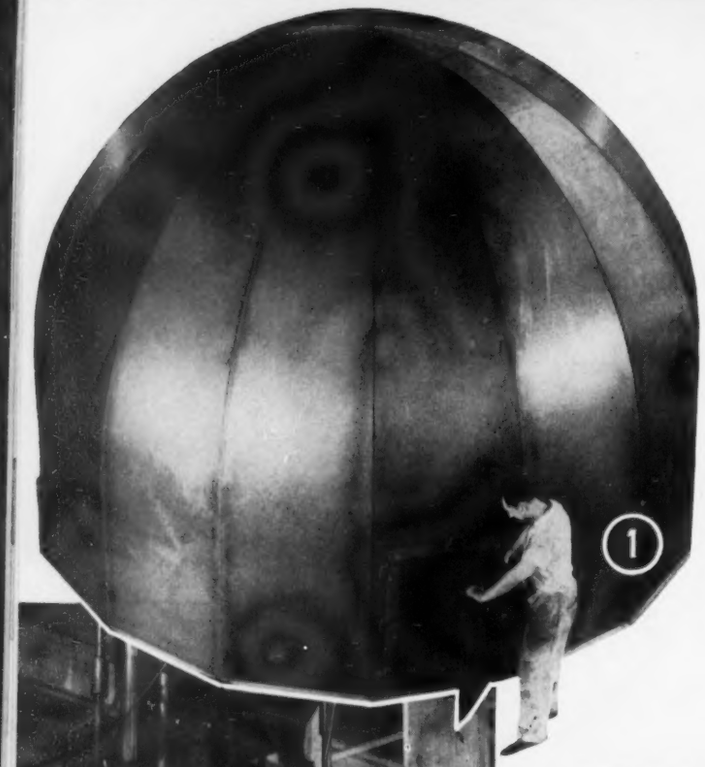
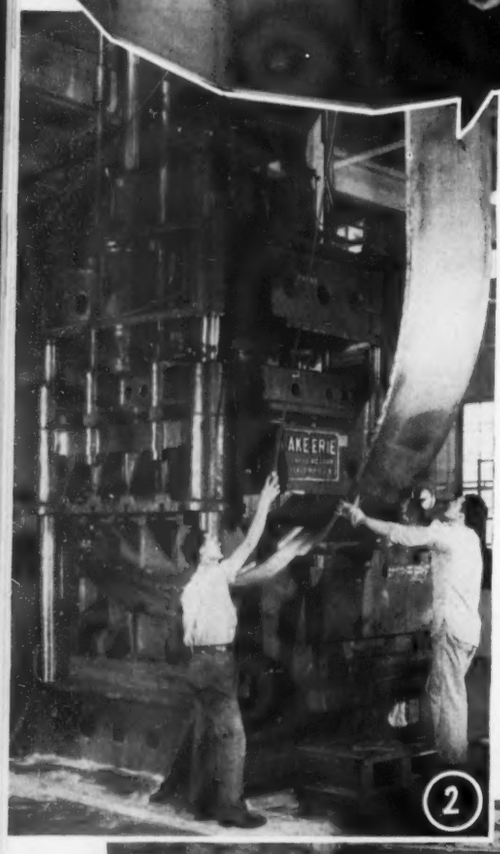
Dual Joining METHOD

. . . employed by fabricator of steel igloos for Navy's reserve fleets. Fasteners and welding "team" to seal half spheres protecting guns against atmospheric attack





ONE of the most interesting phases of the Navy's "Operation Mothball" for preserving in top condition the nearly 2000 ships of the reserve fleets is the use of huge portable steel igloos. These air-tight half spheres are designed to house essential fighting equipment so effectively that reserve units can be put in battle condition, with full stores already aboard, in from 10 to 30 days.

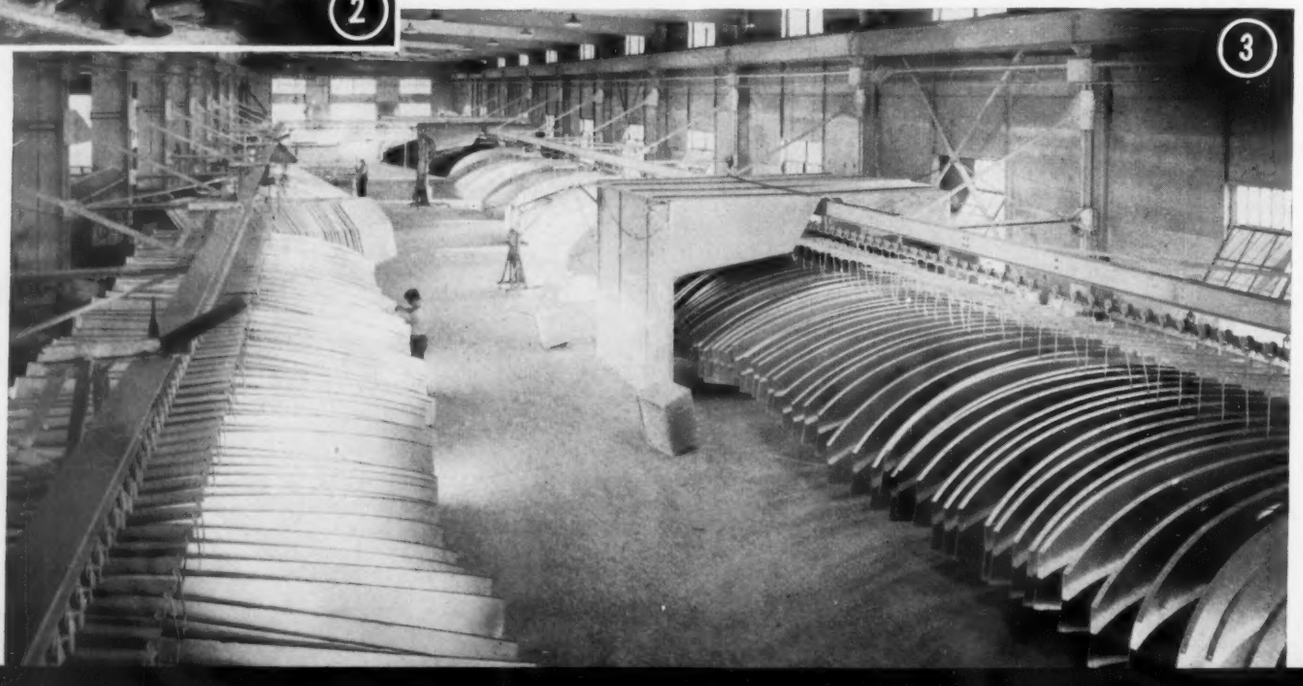
Charles T. Brandt Inc., Baltimore, the contractor who supplied the Navy with approximately half the 5 in. gun turrets purchased during the war, was awarded a major share of the contract for producing these steel igloos. The number of individual units involved in the order, and particularly the delivery time specified, necessitated mass production assembly line facilities. To expedite the work, Brandt engineers designed an overhead conveyor system to carry the subassemblies through the bonderizing and finishing departments and on into the shipping department for crating. Otherwise, existing equipment in the plant was employed.

The completed unit is an assembly of 16-gage steel segments, constructed of sections shaped like orange peels, the

Fig. 1—Steel igloos, 15 ft in diameter and 13 ft high, are made at Brandt's by joining "orange peel" segments paired by welding every other seam and bolting through rubber gaskets the alternate ones

Fig. 2—Lake Erie hydraulic press is equipped with special dies for forming individual segments to a radius lengthwise

Fig. 3—Overhead conveyor system designed by Brandt engineers for the finishing department



sections being alternately welded and bolted together with synthetic rubber gaskets in the vertical joints, forming an air-tight half sphere about 15 ft in diameter and 13 ft in height. The bottom is provided with a base-sealing gasket and then clamped securely to the deck of the ship.

Operations required include: (1) Blanking of individual sheets to size; (2) shearing and punching of bolt holes on a 300 ton press brake; (3) then restriking the flanges on still another press brake; (4) forming in special dies the orange peel segment to a radius on Lake Erie press shown in Fig. 2; (5) tack welding the segments in pairs preparatory to arc welding, both operations being done in special jigs; (6) running a continuous arc welded bead down length of joint; (7) assembling these joined segments with other pairs, similarly welded, by bolting together at the rubber-gasketed flanges, apparent in the darker seams of structure, Fig. 1.

Final steps in processing are shown in Fig. 3, a view of the new conveyorized finishing department. Here, the segments are suspended from individual spreader bars attached to the conveyor which passes them first through the bonderizing tanks at extreme end of lefthand line, thence around the horseshoe and through painting booths and drying space.

In designing these structures, weight was an important factor; however, strength was necessary, too. Despite their light construction they will support a live load of 20 lb per square foot of projected roof area and withstand a 120 mph gale without leaks or ruptures. Portability by cranes is insured by the bolted-on cap with four eyeleted lifting lugs attached. The door is put in place after assembly on the vessel. Double segments and parts are shipped knocked down.

Protect Antiaircraft Guns

The igloos are used to protect 40mm quadruple antiaircraft guns. They are airtight and a relative humidity of below 30 per cent is maintained to prevent rusting, mildew and corrosion within the sphere. This is accomplished by a static moisture removing agent in the individual structures or by connecting the structure to the hull of the ship which is also maintained at a relative humidity below 30 per cent by mechanical means. Single units not connected to the ship must be provided with a breather to equalize air pressure due to change in temperature. This breather must also control the moisture content of the air taken into the structure.

Electrodeposited Metallic Coatings Tests Published

Fifty-two page compilation of standard specifications and tests for electrodeposited metallic coatings was published recently under joint sponsorship of American Society for Testing Materials and American Electroplaters' Society. The publication, on sale for $1.25 per copy, specifies various types of coatings on steel and nonferrous metals. It includes requirements for nickel and chromium on copper and copper-based alloys, and on zinc and zinc-base alloys. Another specification covers chromate finishes on electrodeposited zinc.

Two tests, lately coming into rather wide use, are given in the book—one covers salt spray testing and the other, local thickness of electrodeposited coatings. It also embodies two recommended practices, one pertaining to chromium plating on steel, the other, preparation of low-carbon steel for electroplating. Copies of the publication are available from ASTM headquarters, Philadelphia.

"TRAINED DOG"

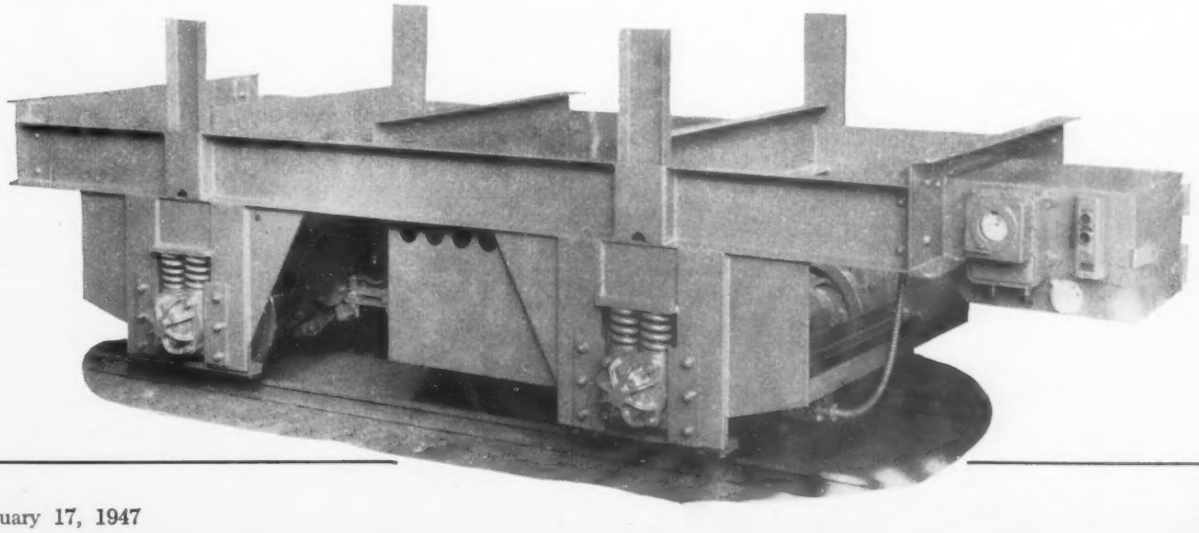
Simplifies Short Haul Service

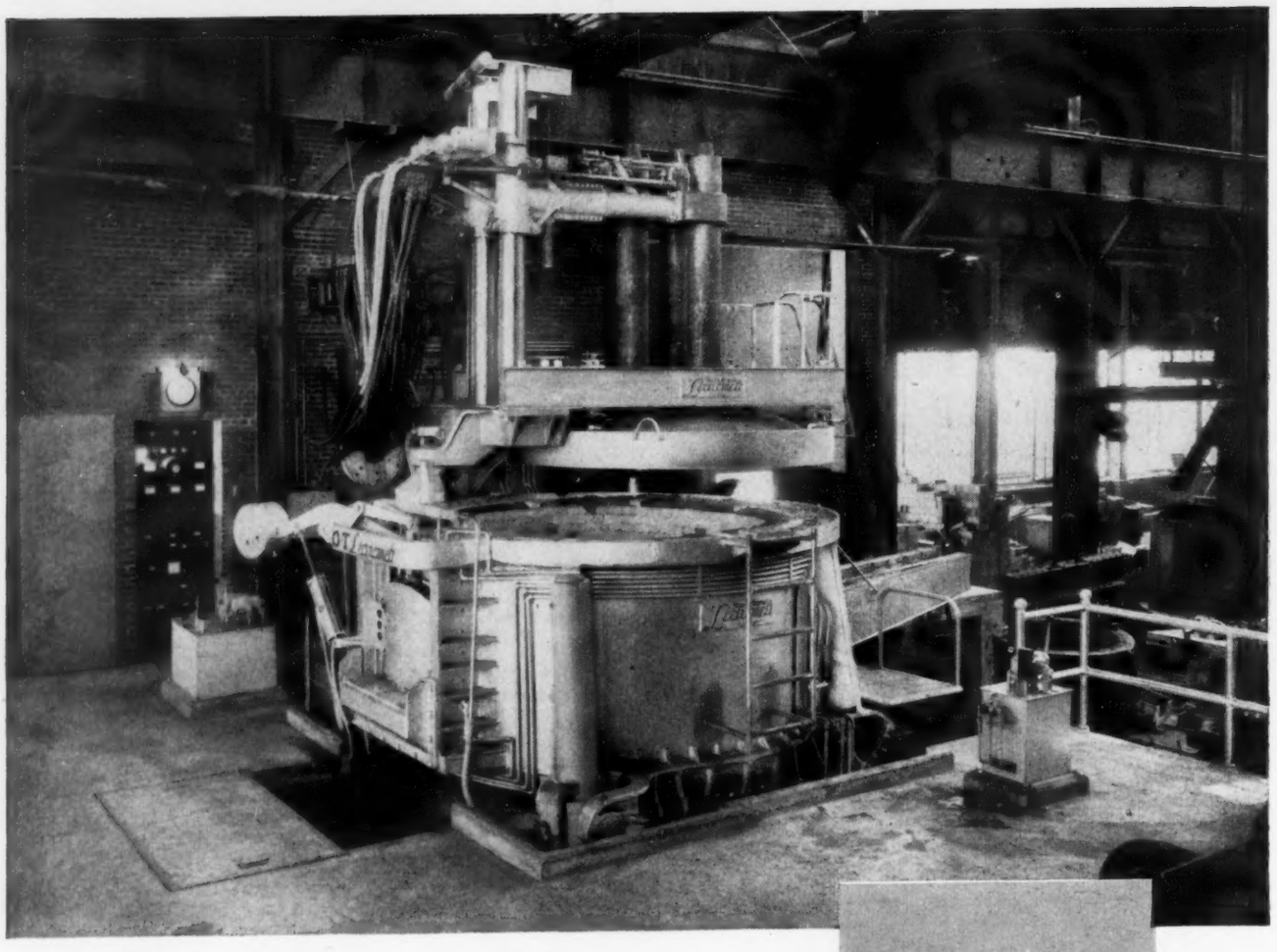
SPECIAL type of self-propelled, self-contained, electrically-operated flat car shown in the accompanying view, is used in many steel plants for transferring materials from one craneway to another or from department to department.

Often referred to as a "trained dog," it is operated by means of a rope or chain attached to the controller. If the operator is walking ahead of the car, tension on the rope on the controller handle is released if he should stop; consequently the controller handle returns to the "off" position and the car stops. Car is designed so that it cannot exceed a safe walking speed of the operator.

Car is powered by a storage battery, and equipped with a fully automatic battery-charging motor-generator set, making it possible to charge the battery at any point in the plant where there is an electrical outlet.

Manufactured by Atlas Car & Mfg. Co., Cleveland, the car can be built in almost any capacity and to suit specific conditions. Present capacities range from 5 to 40 tons. As shown here, it can be equipped with stakes along the sides to handle pipe, tubing, bars, structural shapes or any long members.





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PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH 30, PENNA.

PIPE-LINE INSULATION
Minimizes Steam Losses

Application of blanket-type mineral wool to 3000-ft steam line, with sufficient fiberous structure to resist vibration and fracture while retaining high-insulating characteristics and light weight, obviates necessity of additional boiler capacity

TWO years ago Jones & Laughlin Steel Corp. was faced with an important problem. Large volumes of high-pressure steam were needed in the open-hearth and rolling mill division of its Otis plant, Cleveland. Procurement of a new steam generating plant would have required too much time, due to the then tight supply and delivery situation in such industrial units. Yet steam was needed immediately for the reconversion of semi-finished steel.

Steam was mainly required in expanding mill operations, with incidental uses for heat and power. More than half a mile from the point of need, there was an excess capacity, in the form of a complete steam power division supplying other plants and operations. But between the Otis plant and the steam boilers, the intervening 3000 ft included more than a dozen rail lines, roadways, and service lines, precluding efficient installation of the usual underground pipeline.

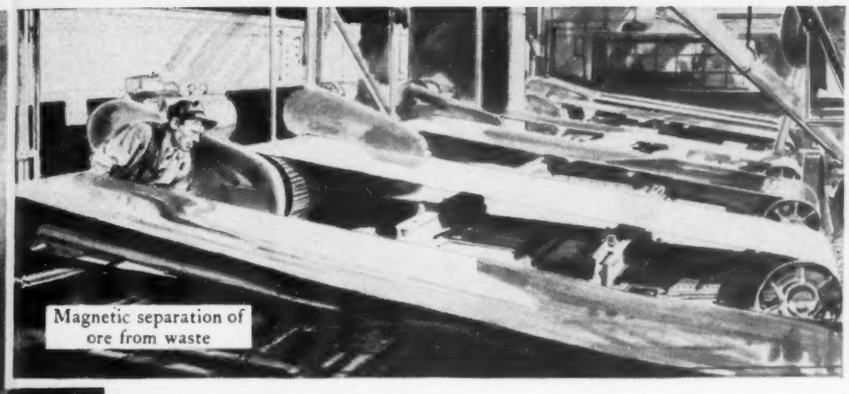
The enigma could be solved by a line suspended from the appropriate spans of one of Cleveland's major bridges across the Cuyahoga river, and thus all intervening obstructions by-passed. All fully-exposed steam lines with which J & L had had former experience were both inefficient from a heat-loss standpoint and a nuisance to maintain in view of the friability of the insulation. Further, it was imperative, if the line were to be sus-

Fig. 1—Approach to J & L open-hearth shop showing 150-lb 550° F steam line

Fig. 2—Overall view of 3000-ft insulated steam line which connects boiler plant with melt shop and rolling division of Cleveland steel plant

SINTERING THE CONCENTRATES
J&L Benson Iron Ore Mines

DRAWN FOR JONES & LAUGHLIN STEEL CORPORATION BY ORISON MACPHERSON



Magnetic separation of ore from waste

J&L ACQUIRES NEW SOURCE OF IRON ORE TO SERVE YOU WITH MORE AND BETTER STEEL

Rich iron ore locked for ages in the rocky Adirondacks is now being mined to serve you through increased production of steel. For a century and a half, since the discovery of iron ore in these ancient mountains, men have tried to recover it from the big deposits. A few succeeded, but many failed to produce enough usable ore to justify developing the properties into full-scale operations.

Today, with modern transportation, new mining methods, new power, new equipment and processes, these granite hills are yielding their natural wealth. Guided by research, the mining, crushing, concentrating and sintering operations at J&L Benson Mines are recovering this rich, black, magnetic ore. Benson ore goes into J&L Controlled Quality steels, such steels as Otiscoloy high-strength steel and Jalloy, the tough steel designed to resist shock, abrasion and dynamic forces.

Tomorrow, J&L geologists will uncover even more deeply hidden treasures of iron ore. These new supplies will help provide an abundance of steel ready always to serve you economically—new steels to assure you that you will not be denied the articles of daily use that make life easier, safer, more enjoyable.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH

SALES OFFICES: Atlanta • Baltimore • Boston • Buffalo Chicago • Cincinnati • Cleveland • Columbus • Dallas Denver • Detroit • Harrisburg • Houston • Indianapolis Los Angeles • Memphis • Milwaukee • Minneapolis • New Haven • New Orleans • New York • N. Kansas City Philadelphia • Pittsburgh • St. Louis • San Francisco • Seattle South Bend • Syracuse • Toledo • Tulsa • Washington

CONTROLLED QUALITY STEELS

J&L STEEL

ADIRONDACK MINES

Iron ore mining in Adirondacks is flourishing today, after nearly a century of neglect, thanks to steel industry's search for new reserves and to more powerful mining machinery and modern research methods. Great deposits of magnetic iron ore in New York State are being developed by Jones & Laughlin and others.

J&L acquired the Benson Mines (3,100 acres opened 1886, worked through first World War, closed 1919, for lack of market) as an iron ore reserve additional to its iron ore properties in Great Lakes region.

Hard rock is crushed fine at J&L Benson Mines, St. Lawrence County, N.Y., to release the iron ore. After rock is blasted out of deep quarry it is crushed in largest crusher system in Adirondacks to the fineness required, then passed through a magnetic concentration plant (see small sketch) to separate ore from waste. The concentrates are then mixed with powdered anthracite coal and fused into sinter resembling black, metallic clinkers, as shown in large illustration. The sintered ore is shipped to J&L blast furnaces in Pittsburgh, Aliquippa, and Cleveland.

Compass acting queerly nearly 135 years ago revealed magnetic iron ore deposits of the Benson Mines. Erratic compass belonged to engineers constructing military road between the Hudson and the St. Lawrence, about 1812.

For lack of transportation these great, rich deposits of iron ore in Adirondack mountains, so hopefully pioneered in the early 1800's, failed at that time to develop into a flourishing industry. Pioneer iron masters repeatedly staked fortunes on these sources of iron and steel, and lost to bad roads, no railroads, sub-zero weather, deep snows, high mountains, endless forests, primitive equipment.

First Adirondack iron works was a Catalan forge erected in 1798 by Zephaniah Platt.

"Ratirontaks," or "tree eaters," was contemptuous name Iroquois Indians called their hereditary enemies, the Algonquins, who, during long St. Lawrence winters when game was desperately scarce, were driven by hunger to subsist on buds and bark. The derisive name became Adirondacks.

For assistance in selection and use of steels and steel products, contact nearest J&L District Sales Office listed at left or write: Publicity Manager, Jones & Laughlin Steel Corporation, Pittsburgh 30, Pa. From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in Otiscoloy and Jalloy (hi-tensile steels). Principal products: **Hot Rolled & Cold Finished Bars and Shapes; Structurals & Plates; Hot & Cold Rolled Strip & Sheets; Tubular, Wire & Tin Mill Products; Precisionbilt Wire Rope; Steel Barrels & Containers.**

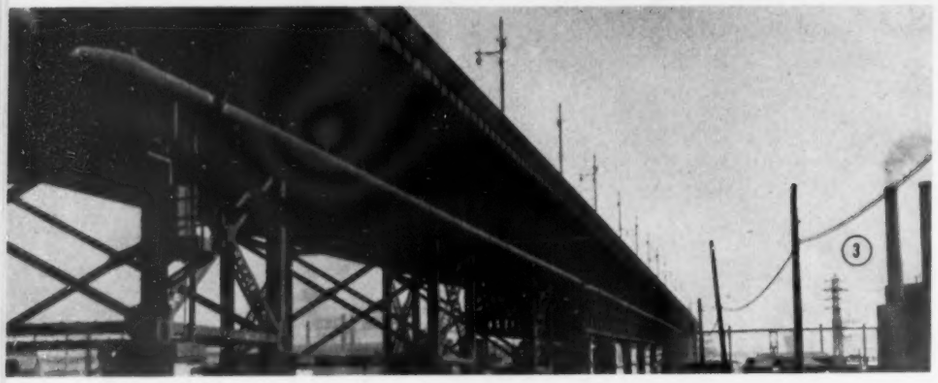


Fig. 3—Steam line suspended from Clark avenue bridge, Cleveland, and serving Otis works of J & L Steel Corp. allowed only 10 per cent loss in temperature

pended so highly, to use insulation which (1) could be largely applied to line lengths on the ground before welding in position, and (2) need not be regularly inspected or patched.

Specifications called for 3350 ft of 14-in. pipe of ⅜-in. wall thickness, all joints to be welded. This yielded a unit line which, with proper expansion bends, would be free from expansion or contraction leaks. The line carries steam at 235 lb at the boiler end, which pressure drops to 215 lb at delivery.

Insulation was accomplished with 2½-in. of blanket mineral wool, wire-faced and metal-lath-backed. All joints of the lath were securely fastened with clinched pig rings. Vapor and weather sealing was done with two layers of 75 lb asbestos felt, asphalt impregnated. The first layer was cemented with 3-in. lapped seams and strapped on 12-in. centers with signode fasteners. The outer layer was similarly lapped, hot mopped with asphalt and strapped on 12-in. centers, the signode straps being spaced to allow 6 in. separation between inner and outer supports. In addition, after the line had been suspended and all welding gaps covered, the entire length was wire wound, then brush coated with a heavy layer of roof-type, cold-resistant paint.

Steam was run through before the supports and weld zones in the bridge section were covered. The initial drop, even in the incompletely protected line, was substantially less than anticipated, being in the range of only 20 lb of pressure drop, coupled with no more than 50 to 70° F of superheat temperature loss.

When insulation was completed, the temperature differential between the initial and delivered steam was only 10 to 15° F of superheat, in steam at 550° F —of which 100° F was superheat which had to be removed before use because of the unexpected high efficiency of the line. This was so superior to the anticipated drop of 70 to 90° F that the engineering department's attention was focused on the economies possible in additional distribution of steam from their large central boiler plant, and the additional boiler capacity originally planned was never purchased.

Performance of the line in the past year has been completely free of signs of deterioration. This, coupled with the measured delivery efficiency, is encouraging a gradual replacement of other pipe insulation materials with mineral wool.

A graphic display of the durable qualities of the insulation was accidentally obtained in the course of certain maintenance construction work on the bridge some months after the line went into service. Bridge contractors were warned to be careful of the steam power line, not to drop bricks, tools, etc., on it during their work. However, inevitably, such objects were allowed to fall on the line in numerous places. Fearing serious harm had resulted to the line, the contractor was required to correct the damage. Some months elapsed before the mineral wool applicator could attend to the repairs. In that time, no perceptible variation in temperature or pressure of the steam was noted. It was feared that sections of the line would have to be replaced, forcing a shut down in service.

However, when detailed study was made, it was ascertained that the shock absorbing characteristics of the lath-backed, fibrous mineral wool had prevented any damage to the steam line itself. The total extent of harm was a number of breaks through the asphalt-felt cover. These were corrected without disturbing service.

This method of insulation even when subject to rigorous Great Lakes weather, vibration, and other unfavorable factors, lends itself for the control of heat losses on hot process lines in addition to steam, air, or water lines. Costwise, insulation of this character, specification, and extent, amounts to about $5.25 per foot.

This 2-year old steam line is being closely watched, both by the subject firm and other interested persons. The multiple advantages should persist over a long period, such as lower capital investment, much lower maintenance, fewer operators for heating and power divisions, lower fuel costs, and higher performance characteristics.

Engineering, Management Bibliography Available

Bibliography of Industrial Engineering and Management Literature, by Ralph M. Barnes and Norma A. Englert; paper, 136 pages, 8½ x 11 inches; published in 1946 by Wm. C. Brown Co., Dubuque, Iowa, for $3.

In this volume are listed more than 1200 books and bulletins in the general field of industrial engineering and management. Its bibliography contains references to over 3000 articles and papers on motion and time study and related subjects.

Its unannotated bibliography contains the name of the author, name of the article, publisher, volume number, page number and date. A classified index of articles and papers under 47 main headings and 79 subheadings is also included.

Metal Industry Directory

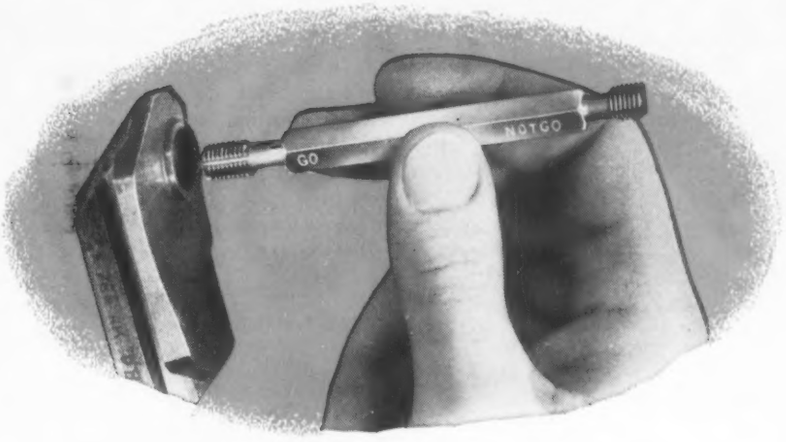
Standard Metal Directory, cloth, 852 pages, 5¼ x 8 in.; published by Atlas Publishing Co., 425 West 25th St., New York 1, for $10.

This is the tenth edition of this reference work, the previous being published in 1943. The many changes in the ferrous and nonferrous metal industries during the war made necessary a complete revision, with all information brought up to date. It is divided into four sections, iron and steel plants, ferrous and nonferrous metal foundries, metal rolling mills and refiners of nonferrous metals.

The directory contains more than 7000 detailed reports on these plants in the United States, listed geographically and alphabetically. The data include name of company, capitalization, when organized, plant locations, main office, officers, purchasing agent and sales manager, plant equipment, products manufactured and types of raw materials consumed.

There are also special lists of various classes of manufacturers, such as pig iron, ores and alloys, sheet metal stampers, die casting plants, scrap iron and metal dealers and many others.

Are you one of the 69.1%?



Graph-Mo Steel can help you meet today's demands for closer tolerances

"WE are planning to work to closer tolerances than before the war," report 69.1% of plants interviewed in a survey by Steel Magazine.

If you are one of this group, be sure *your* gages are made of Timken Graph-Mo steel. The presence of free graphite in its structure, in combination with uniformly dispersed, diamond-hard carbides, gives Graph-Mo the properties necessary for outstanding gage performance.

Graph-Mo steel has remarkable machinability. It offers stubborn resistance to wear. It has extreme structural stability. No wonder Graph-Mo steel gages have achieved such a superior record of accuracy and long service!

To meet today's demands for closer tolerances use gages of Graph-Mo steel. And if you'd like to know more about Graph-Mo, send for our free 48-page booklet, filled with valuable information and illustrations on the use of Graph-Mo and the other famous Timken graphitic steels. Just address a request on your firm's letterhead to Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing

Welded Steel Press

(*Concluded from Page 91*)

to accomplish this operation.

Adaptations for Press Brake: For punching, perforating, and shallow draw work requiring multiple operations, press brakes with flanged beds and rams are being used with multiple die setups. Here it is advisable to use leader pinned die sets to hold the dies in rigid alignment because the gibbing on a press brake is not suitable for this type of work. The limiting features of the press brake are the shortness of the stroke and the fact that it is not practical to use die cushions for blank holding.

Other types of feeds are being used both as a means of getting greater production and to safeguard the press operator. To afford further protection for the press operator, electrical controls are being used more and more. At first they were considered necessary for safety only on large presses. Their successful use on large equipment has led to their being specified by many press manufacturers as standard equipment on all presses. Electrical controls permit more than one control station on a press and prevent the machines repeating due to the operator's negligence or faulty mechanical linkages. It is also practical with electrical controls to interlock the press motion and the feed motion so that if anything gets out of line or jams, the press will stop. Electrical controls also allow die setup work to be done with pushbutton control, minimizing the possibility of the operator being injured in this type of work.

Co-operation Solves Problems

The press user and the press manufacturer together are rapidly finding the solutions to their problems. It is well for the press user to remember to make use of the press manufacturer's engineering knowledge and ability to help with pressing problems. It is well also for the press manufacturer to listen to and profit by the experiences of the press user in the operation of the machines.

With these thoughts foremost in the minds of press users and press manufacturers, our production problem "gullies" are being bridged as fast as they appear.

Business Chart Offered

Business booms and depressions from 1775 to date is shown in a chart compiled by Upson Co., Lockport, N. Y. It shows periods of prosperity, cost of living, commodity prices, federal debt and national income, identifying each with the president in office.

Causes of depressions and periods of prosperity are given, along with pertinent facts to help the reader to fully comprehend the chart.

Metal Printing

. . . . offers metal decorators another "tool" for cutting production costs

By C. W. DICKINSON
Manager
Offset Press Division
R. Hoe & Co. Inc.
Bronx, N. Y.

FROM the time the alarm rings in the morning until one turns in at night, an individual's day is spent handling metal containers gaily decorated with color—color applied by offset lithography. He starts with a can of tooth powder, works on to the coffee container and from there, perhaps, to a can of pipe tobacco —possibly ending up the day with a can of beer.

Trend toward metal containers was well under way when the war interrupted its development. Manufacturers found that attractively decorated metal containers "sold" their products. In some instances added to the display advantage was a decreased cost of packaging over paper. This was gained through mass production methods. A further contributing factor in the growing popularity of the metal container is the ease of storing and handling.

In the ten years prior to the war, numerous manufacturers were drafting designs for new packaging of their products to take advantage of the merits of metal containers. Most conspicuous of these were oil and brewing companies. However, war-time metal shortages temporarily interrupted their plans. The present metal situation is somewhat better and a steady improvement in the supply of tin plate and steel sheets is anticipated during the coming months.

Offset lithography on metal has spread from containers to other fields. For example, many toy manufacturers recently lithographed bodies and wheels, as well as other nonmechanical parts in multicolor on an offset press. This use of offset lithography suggests a vast potential field for this technique. Further expansion of the technique is expected in metal bottle tops, jar closures and advertising media. Offset printing on metal also is expected to become a factor in other fields where spray methods are now used.

Contrary to what might popularly be supposed, offset metal printing antedated paper offset by nearly twenty years. These old offset lithographic presses were of the flat-bed type. In 1912, R. Hoe & Co. brought out its first rotary metal decorating press, a single color, hand-fed machine. Tin plate and other metals of various weights in sizes ranging from 14 x 19 in. to 26 x 34 in. were fed into the press, decorated and then automatically carried by conveyor directly into the drying or baking oven.

Next development in metal lithographing came in 1917 with the creation of the first 2-color metal decorating press, operating at about 2500 sheets per hour.

During this period the fast growing metal decorating industry was searching for an automatically fed press to further speed up production. Hoe developed such a press in 1936. It can be stacked with 5 or 6 tons of tin plate. The metal sheets are printed in perfect register, pass automatically to the drying oven and, without further handling, are delivered fully dry from the far end of the oven. This development increased the press speed so that today the presses are capable of operating at a manufacturers' guaranteed speed of 4500 impressions per hour.

As the metal decorating field continued to grow, the demand was still for larger and faster presses. Inquiries concerning presses capable of handling sheets weighing up to 60 lb and ranging in size up to 48 x 72 in. were frequent.

This demand was met recently when the company developed a heavy duty metal decortating press which is automatically fed, and is capable of handling steel sheets as large as 48 x 72 in. and as heavy as 16 gage.

How far offset lithography will be carried into the toy business, caps and closures, the automotive field, and small parts manufacture is anyone's guess. It is certain, however, the high-speed rotary offset lithographic press offers metal decorators another "tool" which may help to cut production costs.

Above: Centrifugally cast monel metal plating roll being finish-machined at Shenango-Penn.

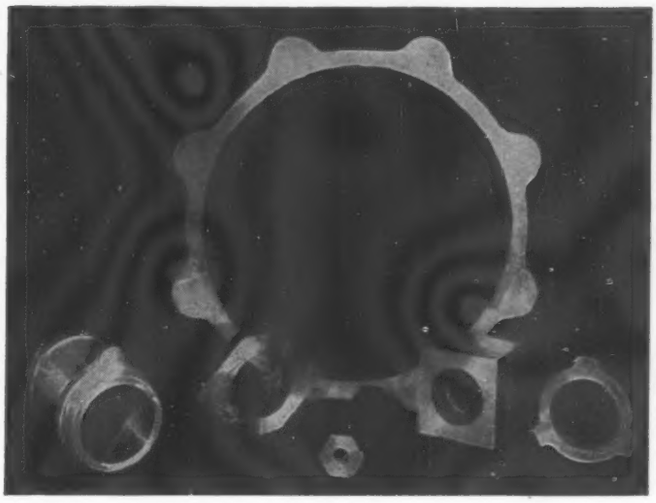
Below: These shapes, all centrifugally cast, show that Shenango-Penn process is not limited to shapes of simple circular section.

VIRTUALLY any engine, machine, or unit of equipment requiring symmetrical parts can be improved by using Shenango-Penn centrifugal castings instead of ordinary castings. This is true because, metal for metal, parts produced the Shenango-Penn way are measurably superior in tensile strength, density, hardness, and uniformity. They have finer grain structure, are better able to withstand friction, abrasion, corrosion, and all kinds of stresses.

These are not mere "laboratory" differences of meager value. They are distinct advantages that time and again have resulted in stronger, more durable, better performing products for Shenango-Penn customers.

Applying Shenango-Penn centrifugally cast parts is also a good way to reduce costs. The castings require less machining, saving time and metal. There are no sand inclusions; no blow holes to contend with. Superior, more uniform grain structure makes it easier, less expensive to attain the desired finish!

Shenango-Penn has complete, modern facilities to carry your machining requirements as far as you wish, can supply either rough castings, semi-finished or completely machined precision parts to your specification.



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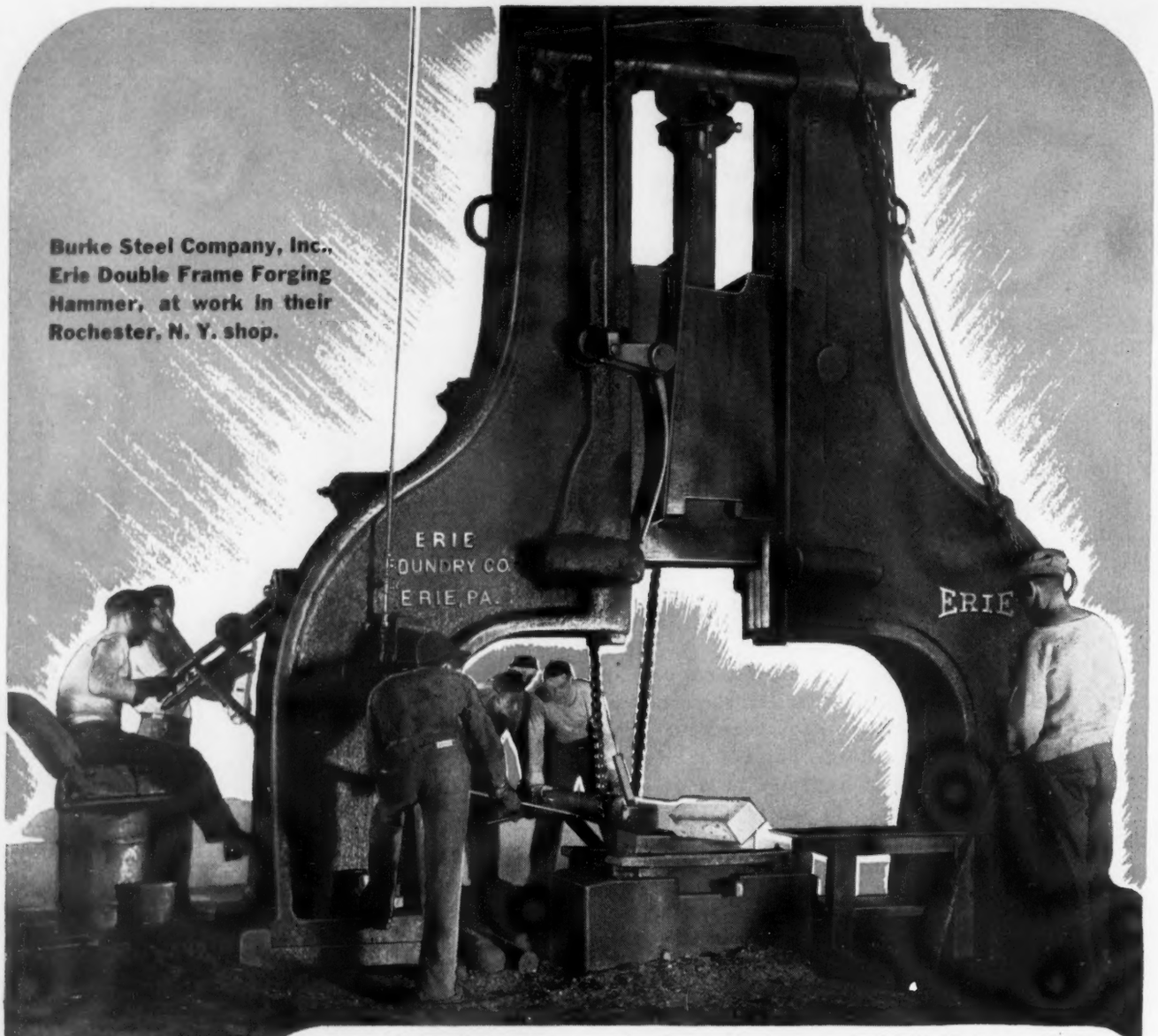


Burke Steel Company, Inc., Erie Double Frame Forging Hammer, at work in their Rochester, N. Y. shop.

A TOUGH JOB • a tough hammer

ERIE Double Frame Forging Hammers boost the *continued* high output of the hammer-gang because they are tough, rugged, well built hammers. Sensitivity of control results from simple, efficient design . . . instantly translated into the delivery of terrific power as it becomes necessary . . . Hammergangs like Erie Hammers. Bulletin 345 shows you why . . . Write for it.

ERIE FOUNDRY COMPANY, ERIE, PA.

ERIE

ERIE BUILDS *Dependable* HAMMERS

Flux Injection Cutting

(*Concluded from Page 88*)

use. It was about this time that the "show me" attitude entered the picture.

It was not too difficult to prove the potentialities of flux injection once demonstrations were staged, for it is effective as only a fundamentally simple process can be. Those who watched as skeptics often remained to inquire about delivery dates.

The process makes use of the chemical removal of the obstructing oxides by a flux which is injected directly into the cutting-oxygen stream, Fig. 1, prior to its entry into the cutting torch, so that the finely pulverized flux and the cutting oxygen strike the stainless steel simultaneously at the point of the cut, Fig. 2. Then, as fast as the oxygen burns away a layer of steel, the flux removes the resultant oxides, exposing fresh base metal to the cutting jet.

The flux is dispensed by a flux feeding unit, Fig. 9, a self-contained portable device, holding twenty pounds of cutting flux in a pressurized vibratory chamber. From the chamber, it is fed by a combination of vibration and gravity, under fully adjustable control, to the cutting oxygen stream, whence it is carried to the orifice of the torch in predetermined quantity, according to thickness to be cut.

The unit is equipped with a constant voltage transformer to obviate line drops which might cause variation in flux flow. The control panel includes a receptacle for a simple type of remote control switch, a calibrated dial for adjustment of flux flow by rheostat control of the vibratory mechanism, a pilot light and an on-off switch. Inlet and outlet ports for the cutting oxygen stream, located on the rear of the unit, take standard hose couplings.

The flux-injection method uses any standard flame-cutting machine, which carries a 3-hose torch fitted with heavy preheat tips, Fig. 5. The flux feeding unit is the only special piece of equipment required by the process, except, of course, a supply of the cutting flux.

But for the addition of the compact feeding unit, a flux-injection cutting setup, Fig. 4, looks much the same as any other flame cutting arrangement. The schematic diagram, Fig. 6, shows the line of connections between gas supplies, feeder, and torch. The preheat gases run, in the normal way, direct to the torch. The cutting oxygen line runs from regulator to flux feeding unit via a standard 3/-in. hose. From the flux unit to the torch a 5/16-in. hose, in a length not over 25 ft, is usually used to maintain a full, steady flow of flux. To fit the connection on the flux feeder unit and the torch, this 5/16-in. hose is equipped with standard 3/8-in. glands, a fairly simple switch-over to make in any shop.

In adapting any standard steel working operation to stainless alloys, modifications of the operating conditions and details are usually required, and this is equally true of flux-injection cutting. Not only is a flux added, but slightly heavier preheat is important; cutting oxygen pressures run somewhat higher than on mild steel, and the process requires a tip somewhat larger than that used for the same thickness of mild steel. Otherwise, the usual rules of good flame cutting practice govern the work.

In actual operation of the equipment, only one additional step at start and finish is involved, once all pressures and speeds are adjusted—the switching on and off of the flux unit. A simple rule governs this operation—the feeder must never be running unless cutting oxygen is flowing. Thus, the cutting oxygen is turned on before the feeder unit is started—and the feeder unit is cut off before the oxygen stream is stopped. Adherence to this simple formula effectively prevents flux from clogging in the feeding channel, hose or torch body.

As far as cutting capacity is concerned, the upper limit of thickness which can be cut is greater than that of the usual commercial ingot, riser, or slab, while the lower limit of efficient cutting—except in stack operations— is about 1/8-in. The very light gages below 1/8-in., like all light gage material, are economically and efficiently handled by mechanical means such as shearing and punching, although they are easily within the scope of flux injection through the familiar method of "stack cutting," for stack cutting stainless is even simpler with flux injection than stack cutting mild steel using conventional technique. The insulating effects of the air gap have little or no bearing on results, so that clamping is not necessary. This effects a worthwhile saving in handling and setup time.

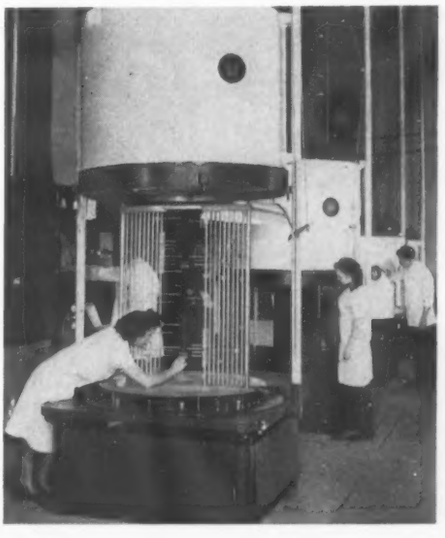
Stack cutting is only one of the standard flame cutting operations whose economy, flexibility and speed are made available to stainless steel fabrication by the flux-injection process. Straight line and circle cutting with track-guided type machines, cut down handling as well as direct cutting costs. Shape cutting machines, guided by tracing heads of hand, cam, magnetic or electronic type, permit rapid production of nested shapes, reducing scrap almost to the vanishing point. In small fractions of the time such pieces could be sawed, nibbled, or chipped to size and form. Risers can be cleanly severed, quickly, on a production basis, leaving a minimum flat pad for grinding —and often obviating the grinding operation entirely. Rough shaping operations prior to machining can be carried to such close tolerances that only a light finishing cut is required.

Advantages of flux injection include the quality of the cut as well as the adaptability of the process. Fig. 7 illustrates several samples of typical cuts. The uniformity of face, is readily apparent in all these samples. The sharp, clean intersection on the double-bevel cut is a clear indication that a high degree of cut control is available with the process. Fig. 8 makes an interesting comparison between a carbon arc cut and a flux-injection cut on the same type 316 riser. In this case the carbon arc cut varies by a matter of over 1 in. from the vertical plane, while the flux-injection cut is flat, even, and of excellent quality.

The multiple nested shapes in Fig. 3 are a clear indication of the type of work done on lighter material. It would be difficult to distinguish between these cuts and similar operations on mild steel so far as quality in the cut edge is concerned.

(*Continued Next Week*)

TRANSPARENT MIRRORS: Thermal evaporation chambers shown here in the Liberty Mirror Division plant of Libbey-Owens-Ford Glass Co., Brackenridge, Pa., are used to surface glass by a method of molecular "bombardment" with chromium particles in the production of transparent mirrors — glass that transmits light as well as reflecting it. Development is reported the first peacetime application of a highly secret wartime advance in glass technology



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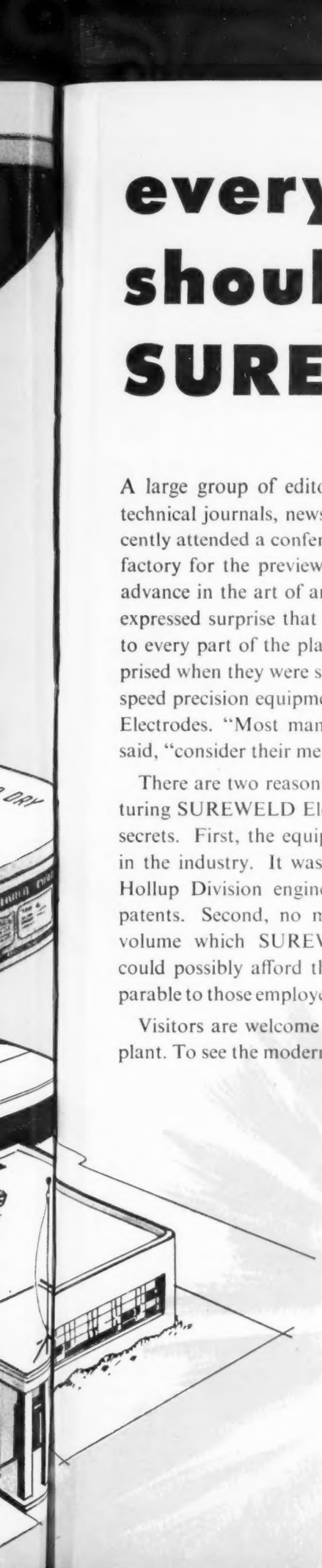

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RELY ON NCG

Control of Vibration

(*Continued from Page 98*)

mounted system in cycles per minute,

g is acceleration due to gravity, 386.4 in. per sec², and,

d is deflection in inches.

For example, if the isolator is loaded so that it deflects 1/16-in., the natural frequency (per min) of the mounting under that load would be approximately 750, i.e., 187.6 divided by the square root of 0.0625 or 0.250, which equals 750.4. If the operating frequency is 1500 cycles per second, the frequency ratio would be 1500/750 or 2. From Fig. 9 the transmissibility is found to be about 0.32, the vibration absorption for this ratio therefore is approximately 68 per cent.

Next step is to select proper mountings. If the machine is supported on legs, the load of the machine must be equally distributed among the isolators placed under each leg. For example, if a machine weighs 2400 lb and is supported by 6 legs, each of the 6 isolators must bear 2400 divided by 6 or 400 lb. The type of resilient medium which could be used in this example application would depend on a number of factors. Thus, since there is no "best type" for all applications, merits of each of the materials—balsa wood, cork, felt, rubber and springs—should be considered and the final selection should be based on the requirements of the task.

Factors Limit Selection

Coming back to the example, if the operating frequency is high, then natural cork, chemically treated to preserve its resiliency, could very well be employed. Certain rubber and steel spring isolators could be used just as well. If strong inorganic acids such as hydrochloric and sulphuric are present, certain grades of felt would be suitable as an isolator provided a grade is chosen that will not deform under the static load to which it will be subjected. With these facts at hand and also noting whether other unusual conditions are present—high center of gravity in the machine, operation of a punch press with an inclined bed, etc.—selection of proper standard mountings can be made in the majority of cases.

Vibration problems related to operating machinery and mechanisms can often be best solved by the use of vibration recording analyzing systems or measuring instruments. Manufacturers of these instruments include: Aeroquip Corp., Jackson, Mich.; Brush Development Co., Cleveland; Consolidated Engineering Corp., Pasadena, Calif.; General Electric Co., Schenectady, N. Y.; General Radio Co., Cambridge, Mass.; MB Mfg. Co., New Haven, Conn.; Western Electric Co., New York; Westinghouse Electric Corp., Pittsburgh.

Following is a representative list of manufacturers of standard isolation units along with the latest available description of the types of isolators made by each one.

American Felt Co., Glenville, Conn., states that in using felt isolation, it is important to avoid conduction through the bolts or other devices for anchoring the machine in its foundation. To prevent any sidewise motion of the machine from a fixed spot: (1) Short studs may be used which protrude part way into the felt from top and bottom (Fig. 4-A) or (2) the felt may be glued with suitable adhesives to both foundation and machine Fig. 4-B or (3) Fig. 4-C, retaining cups may be used which are mounted on the foundation and machine and which support the felt. The cups should be shallow enough to prevent any contact even with maximum loadings.

Table I
NATURAL FREQUENCY OF TYPICAL FELTS
(American Felt Co.)

Material	SAE Classification	Density	f_n Value, 10 psi
5756	SAE F-11	18	22.2
5755	SAE F-6	26	28.6
5754	SAE F-2	34	35
5311	Hair	55	50

Table II
RELATIONSHIP BETWEEN F/f_n AND ISOLATION EFFICIENCY
(American Felt Co.)

Frequency Ratio F/f_n	Transmissibility t	% Vibration Transmitted
1.4	1.0	100
1.5	0.8	80
2.0	0.33	33
2.5	0.19	19
3.0	0.125	12.5
4.0	0.07	7

Efficient isolation can be achieved only by the use of relatively small felt disks under each leg of the machine or at each corner of a flat bed. It can be stated that while an optimum of felt is desirable, a maximum should be avoided. The use of circular felt disks has proven more effective than squares although squares may be used under leg bases if necessary. Experiments have demonstrated that a 1-in. thickness is the most suitable for general applications, but occasion may require the use of pads in greater or less thickness.

In determining mathematically the requirements for isolation, for problems within the intended scope, the following procedure is suggested:

(1) Obtain weight of the machine.

(2) Determine lowest frequency of vibration generated by the machine. This can generally be considered the rpm or some simple multiple of it.

(3) Select value of transmissibility desired (0.2 generally satisfactory).

(4) Calculate the natural frequency for a felt 1-in. thick from formula

$$f_n = \sqrt{\frac{f^2 t}{1 + t}}. \qquad (3)$$

(5) Select type of felt most suitable for use from Table I. This will depend on the value for f_n calculated in 4.

(6) Determine the required load in psi from the natural frequency load curve in Fig. 7.

(7) Determine felt area required by dividing Item 1 by Item 6. The use of this procedure can best be illustrated by the following example.

Typical Problem

A machine weighs 100 lb and operates at a speed of 4000 rpm. It is required to isolate 80 per cent of the vibration with felt if possible. Following through the steps outlined above, will develop the following:

(1) Weight of the machine = 100 lb.

(2) F (frequency) = $\frac{4000 \text{ rpm}}{60 \text{ sec}} = 67$ cps.

(3) t (Transmissibility) 80 per cent absorption or 20 per cent transmitted = 0.2 (Table II).

(4) f_n (Natural frequency) = (Formula 3) = $\frac{67 \times 67 \times 0.2}{1 + 0.2} = 27.5$ cps.

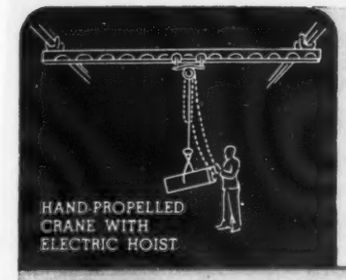
(5) From Table I—material F-6 was selected as approximately suitable due to f_n value.

(6) Curve number 3 Fig. 7 indicates that 27.5 cps give a loading of 11.4 psi.

(7) The required area of F-6 = $\frac{\text{Item 1}}{\text{Item 6}} = \frac{100}{11.4} = 8.8$ sq in. This is to be applied as 4 disks having a thickness of 1-in. and an area of 2.2 sq in.

It is realized that many vibration problems require engineering services. Purpose of this data therefore is to provide useful information to assist in the selection and application of felt for the isolation of small machinery, especially in cases where the services of a trained engineer are not available. The following general statements and examples will prove helpful for average applications.

Greatest isolation efficiency can be accomplished by using the smallest possible area of the softest felt, in a maximum



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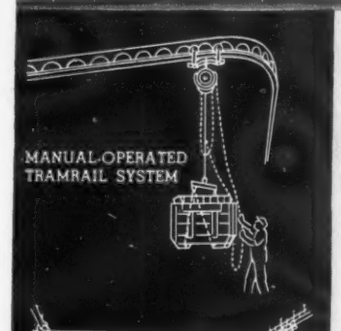

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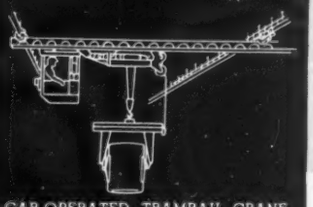

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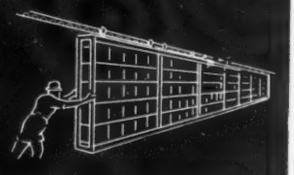

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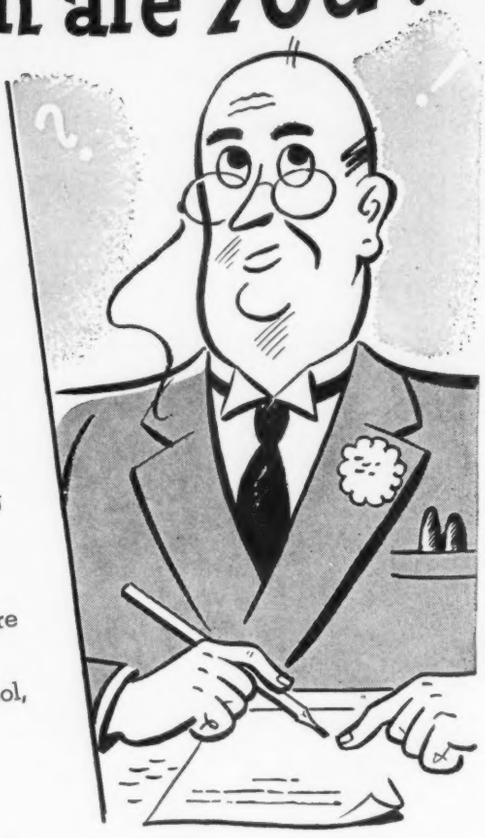

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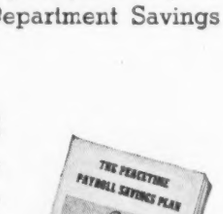

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thickness, under a load which the felt will resist without excessive compression and consistent with structural stability. Ideal conditions for felt isolation therefore might require the use of 6 in. or more of felt thickness using disks of ½-in. diameter. It is immediately apparent that such procedure would make for a very insecure structure and it becomes necessary to limit the felt thickness and to enlarge the area of the disks used, to a point where the machine will rest securely and still allow the felt to function. For general purposes a felt thickness of from 1 to 1½ in. is recommended.

The area of felt isolation generally required can be stated roughly as having 1/20th of the area of the base when the machine has a flat bed. When supported by legs, the area of the base of the legs is indicative of the felt area necessary. In a machine having a flat bed, the area of the base is computed. One twentieth of this area indicates approximately the total area of the felt necessary and the application should be made by using four felt disks each having one-fourth of the total felt area and placed under each corner of the bed.

Felt Under Machine Legs

In a machine having legs, the felt application is made by inserting felt disks or squares under the legs. If the base of the legs is not flat and consists of angle iron or similar construction, a flat protective cover should be provided to prevent the leg from cutting into the felt.. Where vibration is not excessive and the machine weight is heavy enough to insure a permanent position on the foundation or flooring, no special precautions are required. Where vibration of the machine does produce sidewise motion from a fixed spot some method of anchoring the felt to both flooring and machine must be used. Methods similar to those suggested at the beginning of this discussion can be employed. In some cases a simple adhesion of the felt to both floor and machine will suffice. A special cement resistant to oil and water is recommended and can be secured from the company. In other cases it will be necessary to use retaining cups which will be furnished with the felt disks, one of these to be fastened to the machine and the other to the floor as described in Fig. 4-C.

Selecting the proper felt is perhaps the most difficult and important decision. While an attempt has been made to show how to arrive at a conclusion by means of tables and graphs, this would be rather difficult to follow without considerable study. Table III, based on the pounds per square inch exerted by the machine on the proposed felt, will provide a general indication of which felt can be used. In order to simplify the selection only four felts (which are produced to SAE specifications) of variable densities have been considered; these will give a sufficient range for most problems.

Naturally this table cannot be accepted as a complete substitute for an engineering calculation and it is recommended that a user become acquainted with the densities of these four felts by requesting samples. Some judgment will have to be exercised so as not to use a felt which will compress too much under constant loading and likewise, not to select a felt which will be too hard and prove lacking in resiliency.

L. N. Barry Co, Inc., Cambridge, Mass., points out that the usual elementary single-degree-of-freedom concept in vibrations cannot be relied upon in advanced vibration engineering. Extensive studies have been made on modes of vibration and their engineers are prepared to make recommendations based upon a thorough consideration of the problem.

Table III
GUIDE FOR FELT SELECTION
(American Felt Co.)

Material	SAE Quality	Recommended, psi approx. pressures
5756	SAE F-11	1-6
5755	SAE F-6	6-12
5754	SAE F-2	12-25
5311	Hair	over 25

Table IV
VIBRATION ABSORBING RACKS
(L. N. Barry Co.)

Mounting Base No.	Load Range, lb	Length, in.	Width, in.
MT-B-1B	18-40	12-9/16	10¼
MT-B-1C	18-40	15-9/16	10¼
MT-B-2C	18-40	15-9/16	10¼
MT-B-1D	25-50	19-9/16	10¼
MT-B-1D	40-80	19-9/16	10¼
MT-B-2D	25-50	19-9/16	10¼
MT-B-2D	40-80	19-9/16	10¼
MT-C-1C	40-80		15½
MT-C-2C	40-80	15-9/16	15½
MT-C-1D	40-80	19-9/16	15½
MT-C-2D	40-80	19-9/16	15½

In shock protection, the fundamental principle is to increase the period over which the impact forces are applied. This cannot be accomplished by a snubbing mounting which absorbs the shock momentarily only to re-create it, perhaps with even greater magnitude, when the snubbers become engaged. Rubber in compression is recommended when shock protection is paramount because the continuously smooth load-deflection curve presents no opportunity for the shock to be re-created. It is recommended that instead of taking a chance on using the wrong isolator, the engineering staff be consulted first. For the majority of the problems some one type of the standard Barry isolator can be applied. However, even in these cases, it is suggested that the company's engineers study the condition to determine the method of applying standard mounts to ensure efficiency. Standard mounts supplied include:

Type C-2000—Intended primarily as a shock absorber where impacts are encountered. In the isolation of vibrations where frequencies are over 2500 cpm and in general sound isolation. Load ratings from 15 to 200 lb depending on application.This cup mount uses rubber in compression.

Type LW-5200—Useful in the same type of applications as the cup mount. Its center mounting plate is convenient where it is desired to set the mount into a structural member. This mount is supplied for load ratings from 3 to 40 lb depending on type of application.

Type RL-B—Intended for the same type of applications as the cup mount. Its construction permits it to be set into a structural member. Load ratings from 15 to 60 lb.

Type 262—All purpose shock and vibration isolator for supporting industrial machinery. This mount will isolate frequencies as low as 600 cpm and can be supplied for a wide range of loads.

Type 104—Particularly suited to application where low frequency, low amplitude vibrations are to be isolated. This isolator is supplied for loads of from 5 to 25 lb. This mount is usually supplied with a two hole diamond shaped base. This mount is also supplied with square base with four mounting holes.

Type M-112—Useful for any application where rotational resonances must be held to a minimum. Load ratings from 3 to 30 lb. Meets vibration isolation requirements of Navy spec. 16VI (RE).

Type 236—A general purpose vibration isolator which will provide isolation for low frequencies as well as absorb light impact shocks. The mounting is generally satisfactory where natural frequencies in rotational modes are to be kept at a low value, though not quite as good in this respect as the Type M-112.

Type 275—An isolator for frequencies as low as 900 cpm in all directions. Recommended for loads from 5 oz to 3 lb.

Type AVA—A vibration absorbing rack designed to meet the requirements of U. S. Navy, Bureau of Ships, Spec. 16VI (RE), which requires at least 65 per cent isolation for all frequencies above 1800 cpm, limitation of side-sway of ½-in. and operation over a 2 to 1 load range. It is supplied in the standard sizes listed in Table IV.

Electrocon Corp., Freeport, N. Y., is the maker of a type of isolator that uses the cushioning effects of a confined

TABLE V
STIFFNESS COEFFICIENTS
(Fabreeka Products Co.)
Pounds per Square Inch per Inch of Deflection

LOADING—PSI	50	100	150	200	400	600	800	1000
14 ply—¼-in. thick	45,000	50,000	54,000	58,000	71,000	82,000	86,000	90,000
17 ply—9/32-in. thick	36,000	40,000	43,000	46,000	57,000	65,000	69,000	72,000
21 ply—11/32-in. thick	28,000	32,000	34,000	37,000	44,000	50,000	53,000	56,000
31 ply—½-in. thick	18,000	20,000	22,000	25,000	29,000	33,000	35,000	37,000
39 ply—⅝-in. thick	14,000	16,000	18,000	20,000	23,000	26,000	28,000	30,000
Double 39 ply—1¼-in. thick	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000

column of air. Known under the trade name Airjack, this equipment is described to be in effect a spring support with a fixed deflection and a variable spring constant. This is accomplished by applying an air pressure that will suffice to lift the load that is to be isolated. Air column height of the isolator, which is standardized at 2½ in., determines the effective deflection. The natural period of the isolated system for any applied loading is approximately 120 per min. Because of its negligible damping constant, efficient isolation is said to be obtainable for all disturbing frequencies above 400 per min. The isolator is available in standard sizes for various loadings.

Fabreeka Products Co., Boston, reports that the majority of modern manufacturing processes depend to varying degree on the principle of impact, consequently the vibrations which result from these impacts lead to destruction of foundations and often of the machines themselves (due to metal fatigue) to increased maintenance costs, and reduced efficiency of plant personnel. Although Fabreeka isolators (pads made of layers of rubber impregnated cotton duck that have been vulcanized together) is not presented as a cure-all for every problem, tests and experience show that under certain conditions it gives excellent service in reducing the transmission of vibration and absorbing shock.

In dealing with the reduction of transmitted vibrations most discussions are concerned mainly with the general principles of vibration isolation which deal with vibration in the form of a wave motion, and do not consider separately the effect of an impact shock. A heavy impact blow may occur only at infrequent intervals, and in itself may be damaging to mechanical equipment and foundations although its frequency is so low or irregular that it cannot be treated as a wave motion.

The force of an impact is measured by the work done. That is, if a 2000 lb weight drops 2 ft, the work done is 2 x 2000 or 4000 ft lb. To find the force this blow exerts it is necessary to know the distance in which the weight is brought to rest. Assuming that it is brought to rest in a distance of 1/16-in. or 0.0052-in., then 4000 ft divided by 0.0052-ft is 770,000 lb. This result is the dynamic load. If the 2000 lb weight dropping 2 ft is a board drop hammer, and the 1/16-in. deflection caused by the hammer is the deflection of the work being done, then the dynamic load on the base of the anvil is 770,000 lb. The anvil base for a hammer of this size would have an area of about 2000 sq in., so that the unit loading would be almost 400 psi.

If two Fabreeka pads, each ⅝-in. thick are placed under this base, the deflection of the pads under this unit loading is 0.060-in. or 0.005-ft, and if this is added to the deflection of the work which was 0.0052-ft, the total deflection is 0.0102-ft. Dividing 4000 ft by 0.0102-ft, a dynamic load of 392,000 lb is obtained. Without the pads, the dynamic load on the anvil base is 770,000 lb, so it is evident that the pads reduced the impact load on the anvil foundation by 49 per cent.

Often when doing a finishing operation the deflection of the work is less than 1/16-in. and in this case the pads show greater efficiency. For instance, if the deflection of the work in the above example were 1/32-in. or 0.0026-ft, the 4000 ft lb is divided by 0.0026 and the impact load is 1,540,000 lb giving a unit loading of 770 psi. The deflection of two pads under this load is 0.095-in. or 0.0079-ft and adding 0.0026 gives 0.0105-ft total deflection. Dividing 4000 ft lb by 0.0105-ft gives 381,000 lb. Reducing the impact load from 1,540,000 to 381,000 lb amounts to an impact reduction of 75 per cent.

The above examples assume that the anvil and pads are mounted on an absolutely rigid foundation, but in actual practice this is never the case. The exact efficiency would vary, depending on the type of foundation and subsoil conditions. On soft or marshy ground, the necessity of the pads would be reduced because the ground itself would already be absorbing much of the impact. However, there is an additional factor present in these pads that will increase the efficiency beyond that shown by the resiliency of the pads and that factor is damping.

In discussing the absorption of impact shocks, a drop hammer has been used to demonstrate the principles involved because it gives a clear conception of the practical nature of impacts. In the case of a steam forging hammer, the same general principle may be applied, except that the steam pressure brings the hammer down with a greater acceleration than that of gravity alone, so that the force of the blow on the anvil is greater. For absorbing impact blows an application of these pads will help. If the load is very light and the pad very thin, it will still absorb impacts, although a pad properly engineered will be more effective. Obviously, the thicker the pad, the more absorption will be obtained, but the number of pads that may be used is often limited by the importance of maintaining proper stability.

When it is desired to reduce transmitted vibration in the form of a wave motion, the accepted principles of vibration isolation will apply, that is to say, it is important to consider the natural frequency of a given mass with relation to the frequency it is desired to isolate. To get effective isolation the natural frequency must be less than half of the forcing frequency, and the lower the natural frequency the more the transmitted amplitude is reduced. If amplitude is expressed as a ratio (by dividing the transmitted amplitude by the amplitude of the machine vibration) the relationship is shown by Fig. 8.

From the standpoint of vibration isolation primary interest is in the amplitude transmitted from the machine to its foundation. Transmissibility represents this amplitude, and for perfect isolation this ratio would equal zero. If no mountings were used at all, the amplitude transmitted to the foundations would be the same as the amplitude of the machine vibration, and the transmissibility ratio would equal one. This would be true regardless of the frequency, so that the transmitted amplitude would be represented by the line AB in Fig. 8.

Referring to the dotted line on Fig. 8, it is evident that when the frequency ratio is 2, the transmissibility is about 0.32. This means that the transmitted amplitude is only four tenths the amplitude of the machine vibration, and thus a 68 per cent reduction in transmitted amplitude is obtained. When the frequency ratio is 3 the transmissibility is 0.16 and the reduction is therefore 84 per cent. In every case reduction of amplitude of transmitted vibration will begin when the frequency ratio is equal to 1.414. Therefore, if a definite forcing frequency is to be isolated, the natural frequency of the machine on its mountings can be made sufficiently low to give the required degree of isolation.

Fig. 10 is a nomograph which can be

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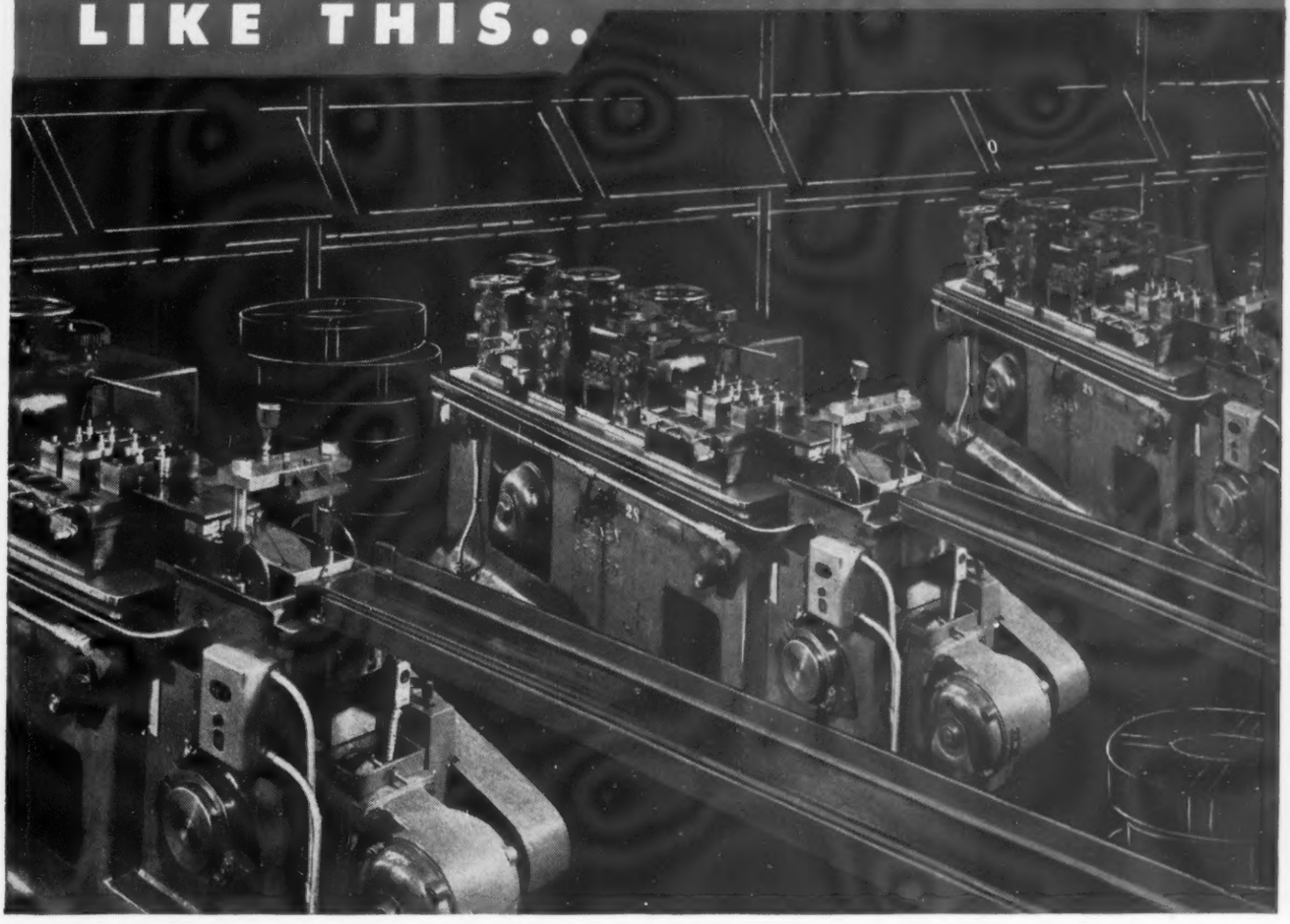

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used in connection with Fig. 8 and Table V to determine the proper mountings for reducing transmitted vibration. Use of this nomograph is not limited to Fabreeka pads only as it can be used for any isolating material, except that when other materials are figured, it is necessary to determine their stiffness coefficient. (The stiffness coefficient of an isolating material is determined from the static deflection curve. This curve shows load plotted against deflection, and this coefficient is determined by dividing the load by the resulting deflection.)

The nomograph in Fig. 10 shows three scales on which are given values for natural frequency, stiffness coefficient, and load. If any two of these are known the third can be determined by laying a ruler across the two known values and reading off the third directly from the scale. The frequency scale is necessarily given in terms of natural frequency, and by means of the frequency ratio the correct natural frequency can be determined for any given forcing frequency. Pads can then be properly designed to obtain that natural frequency of machine on its mountings. A few frequency ratios and the corresponding per cent reduction of the transmitted amplitude when Fabreeka pads are used are given in Table VI.

Table VI
FREQUENCY RATION VS AMPLITUDE REDUCTION
(Fabreeka Products Co.)

Frequency Ration	Per cent Reduction of Amplitude
1.414	0
1.75	50
2.00	62
2.50	78
3.00	82
3.50	90

Table VII
NATURAL FREQUENCY AND LOAD LIMITS FOR SAE FELTS
(Felt Association)
(1-in. thick)

SAE quality No.	F-2	F-6	F-11
Density, lb per cu ft	21.3	16.3	11.4
Load, psi	Cycles per sec.	Cycles per sec.	Cycles per sec.
2	..	..	30
4	..	..	26
6	..	..	24
8	..	29	..
10	..	17	..
15	..	25	..
20	31	..	..
25	29	..	..
30	27	..	..
35	26	..	..

Operation of Nomograph

To illustrate the operation of the nomograph, the following example is given. Assume it is known that the forcing frequency is 100 cps, and that the weight of the machine comes to 100 psi on the machine feet. To get a 62 per cent reduction in transmitted vibration would mean that the frequency ratio would be 2, so if 2 is divided into the forcing frequency of 100, the result will be a natural frequency of 50 cps.

Now turn to the nomograph and lay a ruler or a straight paper edge on 50 on the natural frequency scale. Place the other end of the ruler on 100 psi on the load scale and read the value of the stiffness coefficient required. This is 25,000 and Table V shows in the 100 psi column that 31 ply has a stiffness coefficient of 20,000. A 31 ply material is therefore indicated; the pads to be the same size as the machine feet. But any other thickness in the 100 psi column of Table V having a stiffness coefficient of less than 25,000 would also do the job. Thus 39 ply with a stiffness coefficient of 16,000 would not only be satisfactory, but this coefficient is enough lower than 20,000 to indicate an efficiency even better than the 31 ply. To see just what this increased efficiency would be, lay the ruler on the nomograph so that it connects a stiffness coefficient of 16,000 and a load of 100 psi. This gives a natural frequency of 40 cps, and dividing this into the forcing frequency of 100 cps gives a frequency ratio of 2.5. On Fig. 8 this indicates a transmissibility of 0.22, or a 78 percent reduction of transmitted vibration as against a 62 per cent reduction for 31 ply. These examples will show how it is possible to determine the proper application of Fabreeka for a given set of conditions.

Felt Association, Inc., Technical Sub-Committee, New York, submits the following on this material for vibration isolation in industrial equipment: Wool fibers are natural springs. Vibration isolation, cushioning and padding are consequently among the natural mechanical functions of wool felt. Felt mountings isolate precision instruments and machine tools from floor or building vibration and, conversely reduce the transmission of vibrations generated within a machine. As an isolation medium, it is used in agitators, centrifuges, suction pumps, and numerous other mechanical devices. Grinders, shears and punch presses are effectively isolated with felt.

Principal application of felt in the field of vibration isolation involves the use of simple pads of this material, used by itself. Often the customary floor fastening of felt mounted production equipment is omitted altogether. In other instances, felt pads are cemented in place, no lag screws being required. This method of fastening is not only simple, rapid and inexpensive, but greatly facilitates moving; when a machine is to be shifted it is merely necessary to dissolve the cement bond and then pick up the machine and take it away. Moving becomes quite an item of time and expense in some types of manufacturing, especially where short runs, or seasonal product changes involve the relocation of equipment periodically. Felt is also used in combination with other materials in a number of vibration isolators, usually, though not always, as the resilient medium. In one case, a felt gasket surrounds the floating member of a steel spring isolator, serving in part as a seal and in part as a friction damper. Another composite application that has recently come into considerable use is a metal shoe having an insert of specially treated felt used under the feet of business machines to prevent them from walking around polished floors in offices. A composite application of a different type is one in which a felt gasket is used, partly as a seal and partly as a friction damper in the form of a gasket surrounding the floating member of a spring isolator.

Quality, Density, Thickness Specified

Because felt pads are commonly specified in quality, density and thickness to suit the requirements of individual application, such mountings are tailored to the machine. In this respect the use of felt differs from that of prefabricated isolators, which may be made up in definite sizes and restricted to definite load ratings.

Since the effectiveness of any mounting is related to both the frequency of the vibrations to be isolated and the natural frequency of the system or material to be employed, it is of interest to review the characteristics of felt in this respect. Table VII, representative of the range of available densities, provides test data on the natural frequency characteristics of three SAE standard felt qualities. Values for each quality are reported only for loads within practical limits of effective vibration isolation.

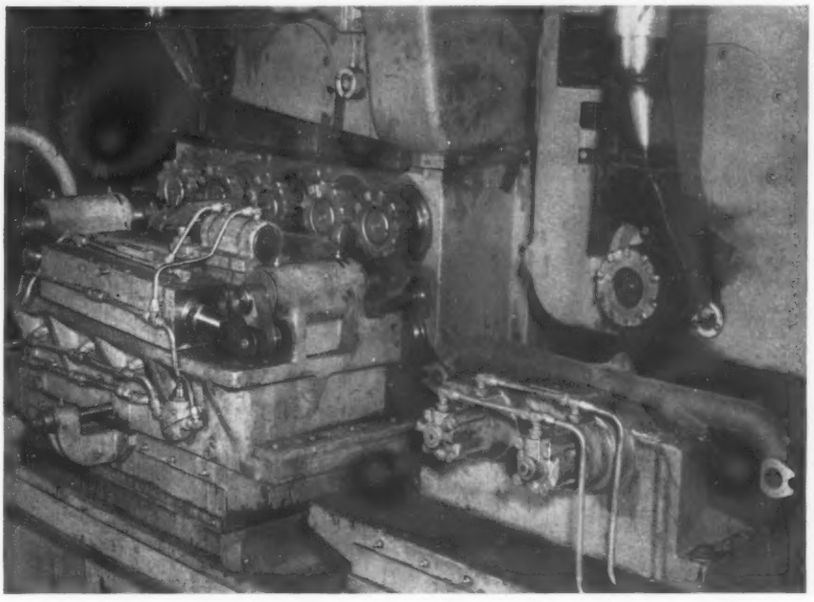
Loading beyond the reported limits will result in excessive deformation, increased stiffness of the system and decreased isolation benefit. Felts of SAE F-11 density are most effective for unit loads of from 1 to 6 psi; SAE F-6 density for loads of from 6 to12 psi, and SAE F-2 density for loads of from 12 to 35 psi.

Extended exposure to lubricating oil and organic solvents has no appreciable effect on the dimensional stability or physical properties of wool felt. Strong inorganic acids, such as sulphuric and hydrochloric, are noninjurious in concentrations up to 14° Bé. The natural destructive forces of atmospheric temperature, ozone and ultraviolet radiation are essentially nonreactive. Felt is unchanged by increased temperatures up to 212° F, and it is the same at minus 60° F as at normal room temperatures.

(Continued next week)

"Rise and Fall" MILLING SPEEDS MANIFOLD MACHINING

Ten cutters in head at left, in this "rise and fall" milling operation, rough and finish five flanges while operator loads fixture at right for machining one flange on an opposite face. Note that cutter heads are equipped with suction exhaust heads for sucking chips away from cutters and work



WORK is done much faster, and provided with truer surfaces in Buick's engine plant at Flint, Mich., due to revised setups recently put into use for facing cast iron manifold flanges. Not only is production increased, but better fits of exhaust manifold flanges with cylinder bosses are secured at points where no gaskets are applied.

Machining is done on the latest Sundstrand "rise-and-fall" milling machines, several of which carry multiple cutters. A duplex machine of this type, equipped with hydraulic quick-acting fixtures and suction hoods for removing chips, is shown in the illustration. Head at the left carries ten cutters of 5-in. diameter that turn at 320 rpm, all blades having carbide tips.

After the manifold is clamped securely by the fixture, the head lowers automatically as the upper set of cutters remove 3/32 to 3/16-in. of metal in a roughing cut from five flanges. Head is then elevated automatically as the second set of cutters remove about 0.020-in. of metal in a finishing cut, completing the operation.

While the left head runs through this cycle automatically, the operator loads a manifold to the second fixture, right in illustration, and the single cutter on the second head roughs and finishes a single flange on the opposite side of the manifold from the five flanges previously machined. With this arrangement and both heads automatically operated, once they are started by a push button, the work done by one head is completed while work is being loaded for other head.

The setup is extremely rapid and highly efficient, besides yielding work of high quality. Machining is completed as fast as loading can be done. Locking of the work is far faster and easier for the operator than if mechanical clamping was required. The suction exhaust system by running chips as they are formed, solves the problem of disposal of the big volume of chips incidental to carbide tooling.

Aluminum Alloy Book Covers Tempers, Properties

Discussion of alloy tempers, physical properties and detailed data on chemical, physical and mechanical properties of high purity aluminum are included in the new data book on aluminum alloys and mill products issued by Reynolds Metals Co., Louisville. Other information on aluminum alloys covers nominal chemical compositions, values of density of coefficients of expansion, thermal and electrical conductivity and annealing and heat treating cycles for wrought, sand, permanent-mold and die casting alloys.

Subsequent chapters take up various mill products, describing manufacturing methods, alloys and tempers in which that product is made, packing, ordering data, commercial and standard sizes, specified chemical compositions and mechanical properties. The 248 page book contains 106 tables, all of which are separately indexed. Book is being sold for $2.00 per copy.

Strippable Plastic Coating is Oil Resistant

Nontoxic and resistant to moisture, abrasion, salt water, aromatic spirits and oils, alkalies and acids, Spray-Peel, a new strippable plastic compound has sufficient adhesion to insure complete sealing, reports Eronel Industries, Los Angeles.

Developed for military use during the war for protection of aircraft "tagged" for overseas shipment or extended storage, the compound is said to be suitable for use on all metals, its adequate tensile strength permitting easy stripping. It may be applied by brush or spray, drying quickly to a rubbery film.

Rust Resistant Coating Handbook Published

Application of rust-resistant coatings to iron and steel by immersion in an acid phosphate bath is described in a 113 page handbook offered by Office of Technical Services, Department of Commerce, Washington. Written by Lloyd O. Gilbert of Rock Island Arsenal Laboratory, U. S. Army Ordnance Department, it was originally prepared for use in rustproofing ordnance equipment.

Rust-proofing processes described use standard commercial phosphating solutions. Directions are given for using two types of coatings, one for high corrosion resistance and the other resistant to the effects of heat, pressure and abrasion. Handbook, PB-32864, is available for $8 for photostat edition or $3 for microfilm edition.

Book Covers Metallurgy Of Aircraft Gas Turbines

Gas Turbines and Jet Propulsion for Aircraft, by G. Geoffrey Smith; fourth edition; cloth, 246 pages; published by Aircraft Books Inc., New York, for $5.

"We are depending heavily upon civilian industry and science to train qualified technicians to provide us with the newest and most powerful aircraft possible . . . we must continue our research and development toward better and still better military aircraft. A large reserve of young engineers, given the proper 'know-how,' is priceless insurance against our country's becoming a second-rate power in aviation." So states Gen. Carl A. Spaatz of the United States Army Air Force in his preface to this book which also has an introduction by Charles E. Wilson, president of General Electric Co.

Included in the volume which, according to the publishers, has been adopted for educational use by colleges, universities and technical institutions, is a section on metallurgy as related to turbine disk and blades and another on testing and maintenance. Reviews of American, British and German gas turbines, as well as illustrations and detailed drawings are included.

The book deals extensively with the fundamental principles, construction, operating, testing and maintenance of the engines. Considerable space is devoted to projected aircraft types to be powered by these units. Quotations from papers delivered by aeronautical and turbine engineers are incorporated into the new edition.

Miniature Auto Plant

(*Concluded from Page* 89)

of a four-story section of the plant, adjoining a one-story section. Close inspection will show overhead monorail, slat and chain conveyors. A ramp with slat conveyor carries bodies from the second floor of the four-story building to the first floor of the adjoining structure, where they are placed on the final assembly line.

Fig. 2 shows, left to right, Earl Clark, assistant plant layout engineer, Frank Crone, assistant master mechanic, and Ray Matthews, plant layout engineer, studying one portion of the model from which the celluloid and wood roof sections have been lifted.

In Fig. 3, Ray Matthews holds a section of the roof of a one-story building while he instructs Kenneth Brown, apprentice, in the proper installation of overhead conveyor lines in the scale model. Small wood blocks represent bodies in process.

Tape Labels Resist Abrasion, Water, Oil

Tape labels reported to be pressure-sensitive—performing sticking jobs with a minimum loss of time and maximum dependability—are being produced in rolls to fit standard tape dispensers by Topflight Tool Co. Inc., York, Pa. Feature of these labels is their laminated construction, accomplished by adding a layer of transparent tape over the printed surface, a construction said to resist abrasion, water and oil.

Fire Extinguisher Facts Presented in Guide

A compact data-guide presenting important facts about suitability, maintenance and performance of soda-acid, foam, pump tank, dry powder, loaded stream, carbon tetrachloride and carbon dioxide fire extinguishers is offered by Randolph Laboratories Inc., Chicago. Reverse side of selector indicates, in relation to various plant fire hazards, how high units should be bracketed, maximum distances of extinguishers from operators and area to be protected by each unit.

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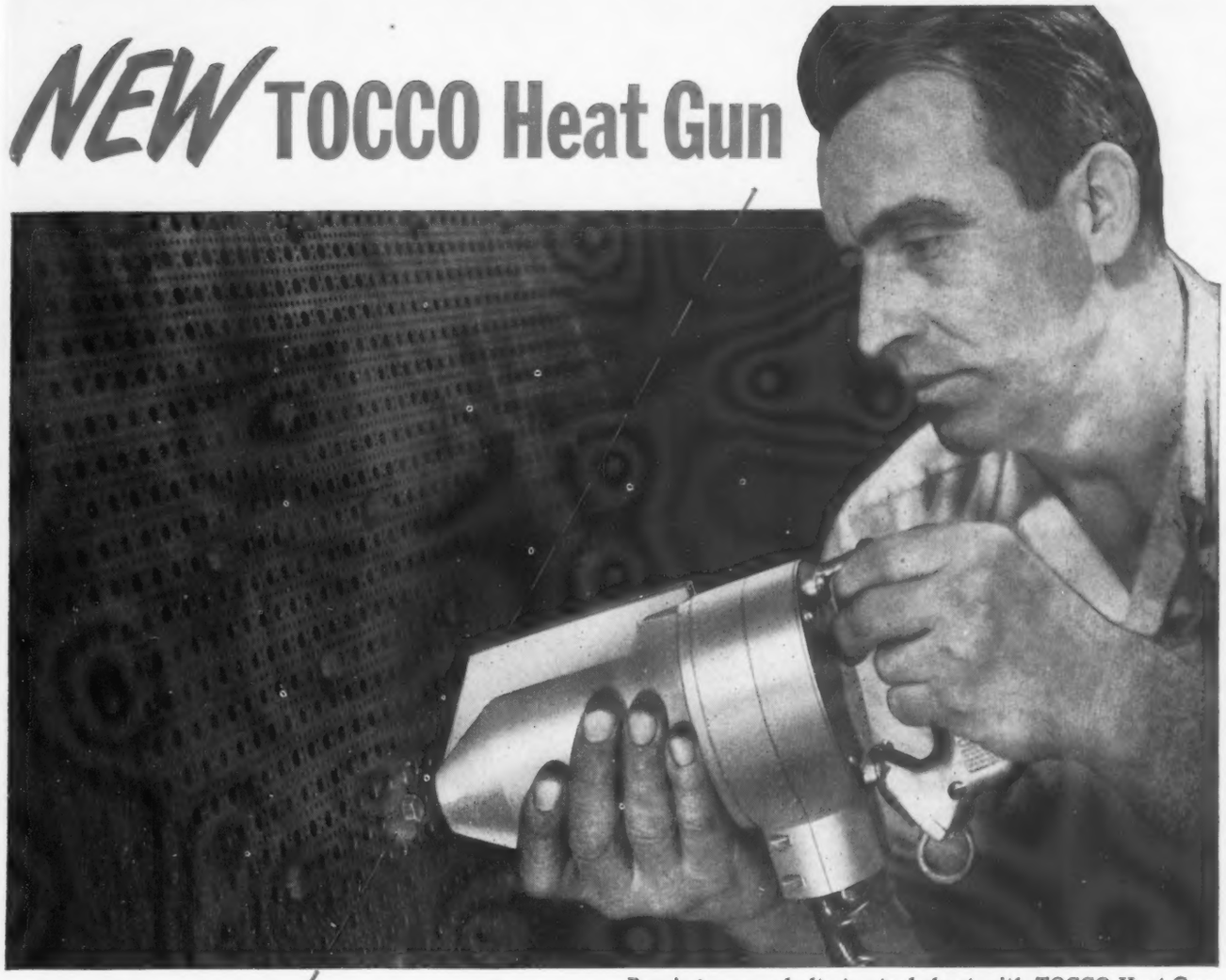

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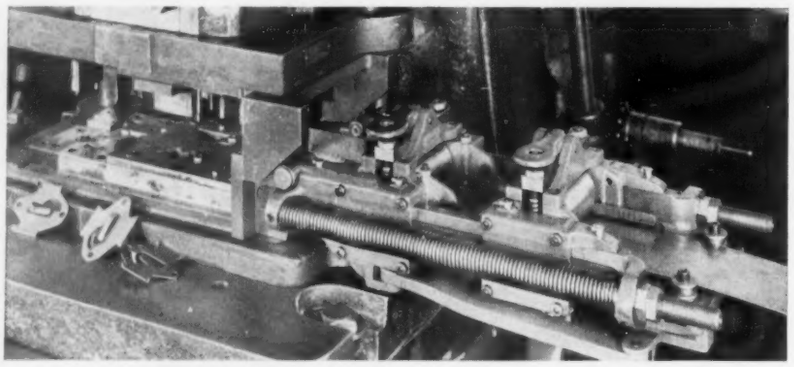
A twin operating cam is attached to the punch holder or press ram. Because they require no connection to the power shaft of the press, the feed and required die set may be set up on any idle press. This is particularly advantageous for short runs, or rush work.

Maximum feed length of both feeds is 6 in. on presses having strokes of 3 in. or more, and approximately double the stroke on others. This increase in range of feed lengths is desirable in cases where only short stroke presses are available or where due to limitations imposed by the die, the effective feeding portion of the press stroke can be greatly reduced.



Book Shows Construction Of Many Jigs and Fixtures

Jigs and Fixtures for Mass Production, by Leland A. Bryant and Thomas A. Dickinson; cloth, 222 pages, 6 x 9 inches; published by Pitman Publishing Corp., New York, for $3.50.

Widespread use of jigs and fixtures as an aid in mass production has increased the value of this comprehensive book not only to trained and experienced tool engineers but also to executives whose knowledge of tooling details is limited. The authors, therefore, combine in this book the fundamentals of the general classification of "jigs and fixtures" with details of specific types of these production aids.

For readers with little experience in the use and construction of jigs and fixtures, the book contains a complete glossary of terms. It is, in addition, profusely illustrated with many jig applications. For the experienced tool designer, who is already intimately familiar with the subject, the book goes into detail concerning selection of materials from which jigs and fixtures may be fabricated successfully. These materials as listed by the authors include: Iron and steel, aluminum and magnesium, and plastics. Comparative merits of these are discussed and tables showing characteristics of each are included.

The book devotes considerable attention to details of construction of several jigs, the largest being the "master tooling dock," an invention of Mr. Bryant. This dock, which is large enough to contain large segments of aircraft during their assembly, is a many-purpose jig permitting semiskilled workers to assemble parts requiring close tolerances.

In an appendix, the following data in tabular form and other information is presented: Hardness conversion table, standard dimensions for nuts and bolts, electrode size and machine settings for aluminum metallic-arc welds, machine settings for spot-welding and seam-welding aluminum alloys, torch tip sizes for gas welding, conditions for heat treatment of aluminum alloys, standards for wire gages, screw thread and tap drill sizes, and heat-treatment procedure for structural steels.

New Enameling System

(*Concluded from Page* 93)

at higher pressure than the oven fans and drives air inward from the oven ends. It is possible for a man to stand in this "end-zone" of the ovens beside the conveyor and experience little discomfort although 10 ft inward from him the oven temperature may be as high as 325° F.

Bodies leaving the oven pass through an arbor of constantly spraying cold water, Fig. 5, followed by an arbor of air nozzles, Fig. 3, that blow cold air all over the body. These arbors combine to cool the bodies from oven temperature to room temperature in about 10 ft of conveyor travel. The quick water cooling also accelerates hardening of the finish, providing uniform hardness along with uniform bake. Furthermore, bodies that would otherwise be too hot to touch, can be worked on by sanding crews within 1 min after they leave the oven.

The new ovens are only half the length of the old prewar ovens in which large volumes of air were handled at comparatively low velocity. In the old ovens half of the oven-travel time was required to raise the body to baking temperature. The new ovens accomplish this in less than 5 min, and cut the total oven travel time fully 50 per cent, which explains their shorter length.

Pneumatic throttles regulate each burner unit to make the uniform temperature control fully automatic. Fire hazard is minimized by the forced draft which "dilutes" volatile elements given off during the bake. For example, more than 9000 cu ft of fresh air are supplied per gallon of thinner that is volatilized. Each burner unit is further safeguarded by automatic controls that prevent the start of combustion until vapors have been purged from the oven by three complete oven changes of fresh air.

Installation of the new ovens was accompanied by addition of new wider spray painting booths of the latest design, Fig. 4, well lighted and ventilated, with a water curtain and constant flow of water beneath the floor for maximum paint recovery.

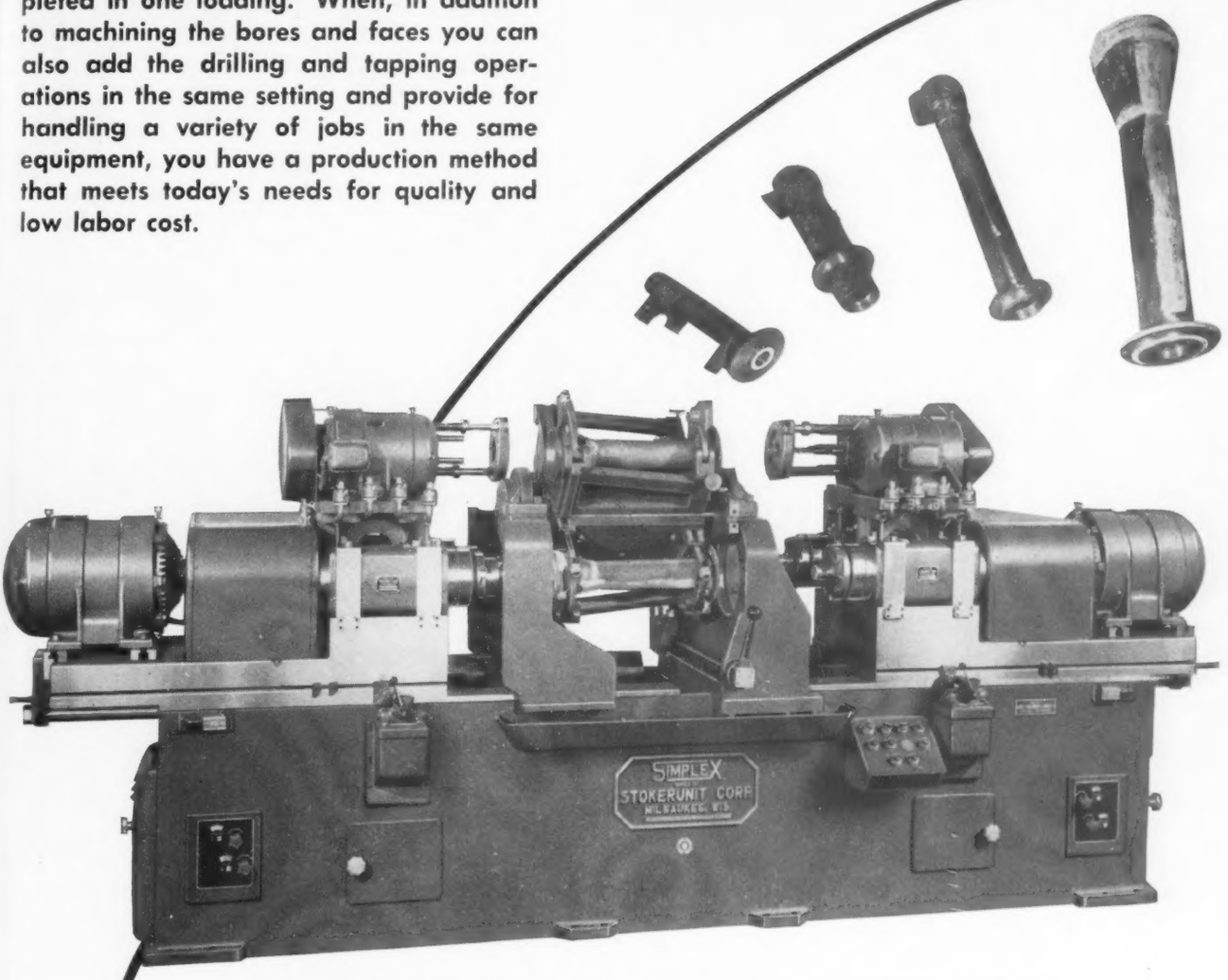
Another new and separate department was created for mechanically spraying hoods, fenders and gravel shields. They are baked separately from the bodies in another set of direct-fired ovens. When various components are assembled with the body in final car assembly, the final color is identical.

—o—

Westinghouse Electric Corp., Essington, Pa., is distributing a booklet entitled "Maintenance Hints for General Purpose Turbines" which discusses installation, piping, lubricating oil, operation, rotor, bearings, governor valve travel, etc.

SIMPLEX

Machining tubular parts where the bores must be concentric, the faces parallel, is a difficult job unless the work can be completed in one loading. When, in addition to machining the bores and faces you can also add the drilling and tapping operations in the same setting and provide for handling a variety of jobs in the same equipment, you have a production method that meets today's needs for quality and low labor cost.



The machine pictured is a SIMPLEX 4U 2-way Precision Boring Machine with four #4 spindles mounting combination boring and facing heads and also carrying unit type drilling heads with bushing plates for the drilling operation. By changing the fixtures, drills and boring tools, the various pieces illustrated can be handled with the same machine, thus this machine becomes in effect a production department in itself.

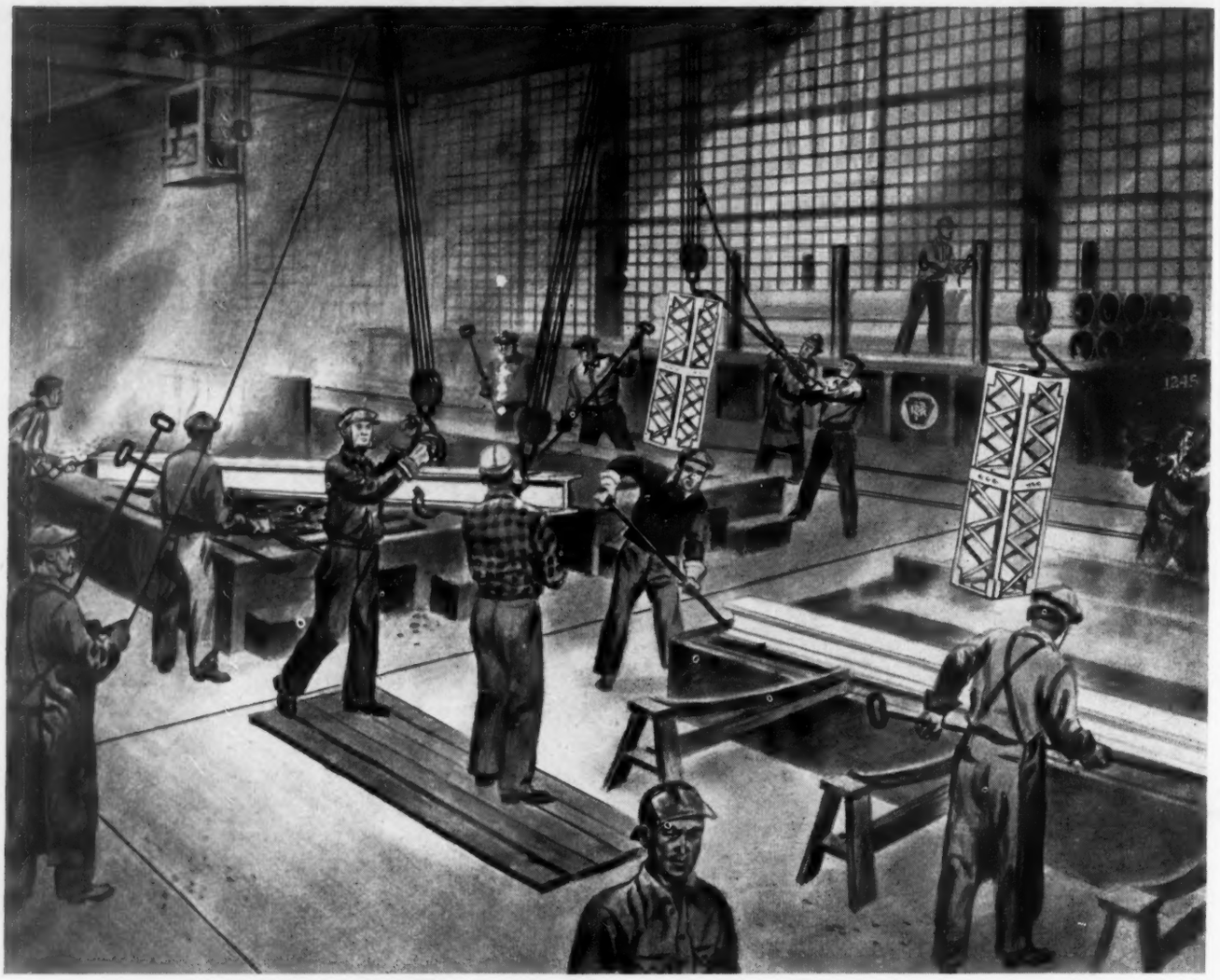
Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4532 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools



Artist's sketch, made at "The World's Largest Job Galvanizing Plant", showing a section of galvanizing and cooling tanks, and a part of the interior railroad siding.

The "go" sign is given—*then* concerted action begins at the Hanlon-Gregory Galvanizing plant. Every galvanizing job progresses with clock-like accuracy because every job, regardless of its size, is fully planned and scheduled in advance of operations.

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HANLON-GREGORY GALVANIZING COMPANY

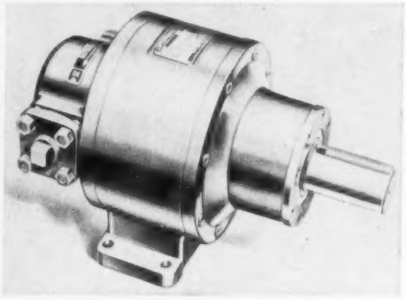
Pittsburgh, Pennsylvania

HOT-DIP GALVANIZING

New Products and Equipment

1. Hydraulic Pump

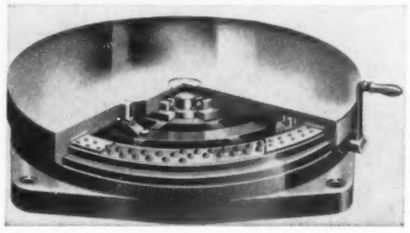
Developing 5000 psi in continuous service, a hydraulic pump manufactured by Superdraulic Corp., Dearborn, Mich., measures but 6 in. in diameter and 11 in. long and weighs 35 lb. A single bank of plungers delivers 3 gpm at 1800 rpm or



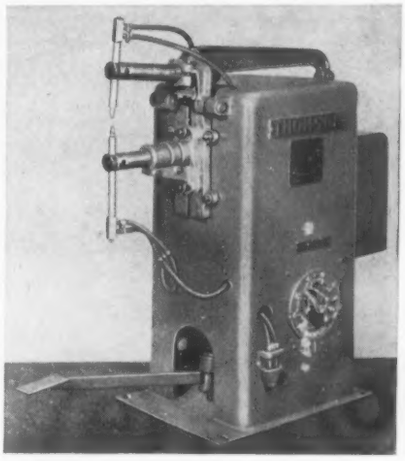
2 gpm at 1200 rpm. Called the Superdraulic Junior, the pump has a high volumetric efficiency—95 per cent with the lightest hydraulic oils. Adaptable as a holding pump to presses and injection molding machines, it may also be used as a reversible hydraulic motor.

2. Index Table

Fast, accurate indexing for a variety of production operations is possible with the index table manufactured by Robbins Engineering Co., 318 Midland avenue, Detroit 3. The table, illustrated here, is



indexed manually and located automatically. To index, the crank handle is turned to horizontal which disengages a large diameter locking pin. As table is indexed handle is released and the table is locked in position. Number and location of index positions is determined to suit application. Table is supported by a large ball bearing which eliminates out-of-parallel conditions due to vertical thrust from cutting tools. Tables are offered in diameters of 18¼, 24¼ and 30¼-in.

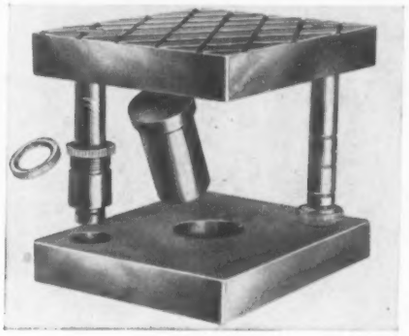


3. Spot Welder

Rocker arm spot welders designed to handle work in the light to medium range are announced by Thomson Electric Welder Co., Lynn, Mass. Welders are available as foot, air or motor operated machines with 12, 24 or 30 in. throat depth and 20, 30 or 40 kva-transformer capacity. Features of machines are: Tubular secondary transformer with noncorroding, nonclogging secondary sections and hard rolled primary windings; fabricated steel frame, reinforced to minimize deflections; eight-point clamp type heat regulator with star locking wheel to prevent drifting and insure efficient contact; and indexed terminal block on which all wiring or air or motor operated machines is centralized to facilitate maintenance, testing and inspection. Electrodes and transformers are water cooled from separate circuits with individual flow control.

4. Die Set

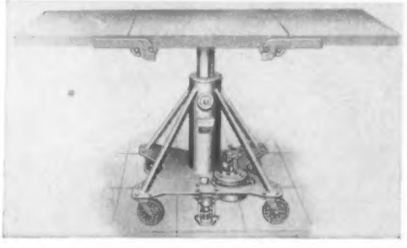
Guide post bushings of phosphor bronze, tapered and made to turn and contract or expand as desired by loosening a lock ring and turning the adjustment ring accordingly, are a feature of the die set announced by A. W. Grunow Co., 563 White street, Orange, N. J. As lateral thrust wears the bushings the lock rings are loosened, a slight turn given the bushing and the lock ring tightened. The punch holder always slides up or down and stays put on the



guide posts with a touch of a hand. When all bushing surfaces are completely worn, they may be replaced in a few minutes. Post alignment is assured at all times as punch holder and die shoe are bored together.

5. Elevating Table Extension

Removable table top extensions are being offered by Lyon-Raymond Corp., 3057 Madison street, Greene, N. Y. for



their hydraulic elevating table. These are designed to adapt the table to strip and sheet feeding operations. In cases where long strip or sheet stock must be fed to presses, the addition of the ex-

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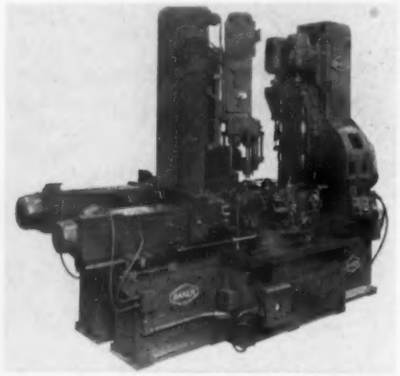
tensions provides firm support for a length of 72 in.

It is necessary only to lift an extension by the end to disengage it from the attachment pins. Extensions may be ordered with a table or purchased afterward for installation on a table already in use. A modified hydraulic elevating table can be furnished for sheet feeding where a support longer than 72 in. is required.

6. Multiple Unit Machine

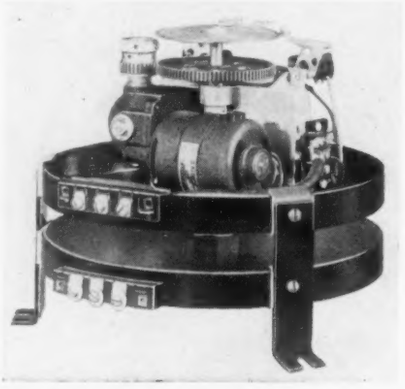
Drilling, boring, reaming, facing and tapping operations are performed on one machine, manufactured by Baker Bros. Inc., Toledo, O., for handling cast iron. Specially designed machine has a four-



station, automatic power indexing table, each station arranged for rechucking one part and the chucking of one new part. Built around the index table are 10 independently fed auxiliary units, consisting of four self-contained hydraulic units mounted in horizontal and vertical planes. Parts are machined from five directions and all holes from horizontal units have two separate operations.

7. Rheostat Motor Drive

Development of a new small motor drive designed for remote and automatic operation of single or multiple stamped steel rheostats controlling generator voltages, motor speeds, lamp intensities and other applications is announced by Ward Leonard Electric Co., Mount Vernon, N. Y. Drive is available for alternating and direct current, 115 or 230 v operation. Standard units have 30 or 60 sec travel from the "all resistance in" to the "all

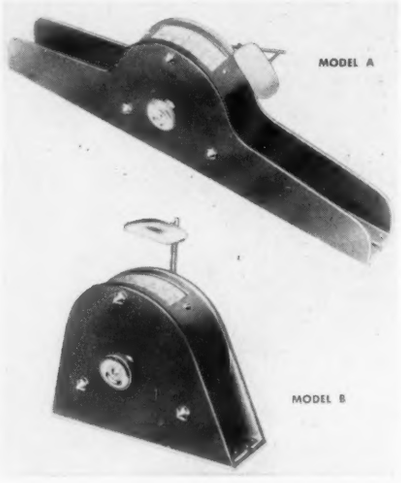


resistance out" position, but can be furnished for shorter or longer travel time. Constructed on a 13 in. diameter steel plate, drives are intended for mounting on extended rheostat feet. Features include: Adjustable limit switches, slip clutch readily accessible on removal of cover; cast mounting base for motor, gears, limit switches and drive shaft.

8. Vernier Angle Gage

Clinometer vernier angle gage is announced by Engis Equipment Co., 431 South Dearborn street, Chicago. This instrument, used to measure angles and inclinations, is made with an all-aluminum housing. It may be used on various types of machine tools, lathes, drill presses, shapers, gear hobbers, etc., and for test setups in the inspection room. Models A and B (shown) are recommended for general purpose, while other models are for specialized fields.

Action of the instrument is by a free swinging drum graduated 360 degrees, supported by ball bearings. When the device is applied to an inclined surface, the drum swings to a position which brings its center of gravity under its center line. Degrees of inclination can be read from a pointer located above the drum. Minutes of the arc are indicated



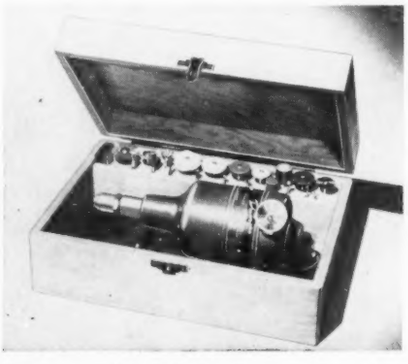
by a separate vernier scale. Reading accuracy of vernier is 1 min of arc. Reading is facilitated by an attached magnifying glass which enlarges both scales.

9. Welding Torch

Welding torch W-46 embodies a feature that permits wider operating range and easier handling—the full "handle length" lever which makes it possible to shut off or release gas with only finger-tip pressure. This feature is combined with the built-in automatic Gasaver. It is offered by Weldit Inc., Detroit.

10. Hand Grinder

Dual-purpose tool for use either as a straight hand grinder or with an attachment which converts it to a flexible shaft tool is announced by Dumore Co., Racine, Wis. The flexible shaft conversion at-



tachments includes a hanger, in which the tool is clamped, a 36-in. flexible shaft which chucks into the tool, and a choice of three different handpieces. Motor is 1/14-hp and chuck has 1/4-in. capacity and can be adapted to 3/32 and 1/8-in.

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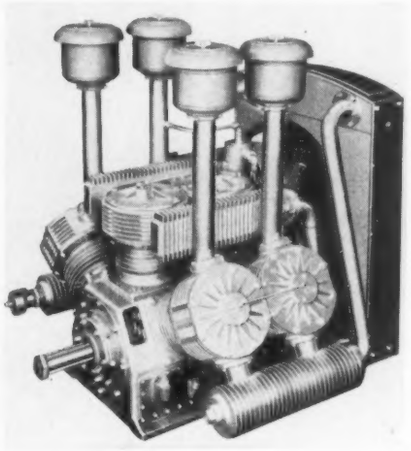
shank tools with collet sleeves provided. Tool is offered in standard kit which has nine different accessories, and in a deluxe kit which includes 27 accessories.

11. Air Compressors

Davey Compressor Co., Kent, O., announces a line of air-cooled portable compressors of 60, 105, 160, 210 and 315 cfm capacity. All units are of V-type cylinder design, except model 315, which is of "W" construction with four low-pressure and two high-pressure cylinders. Units operate at relatively slow piston

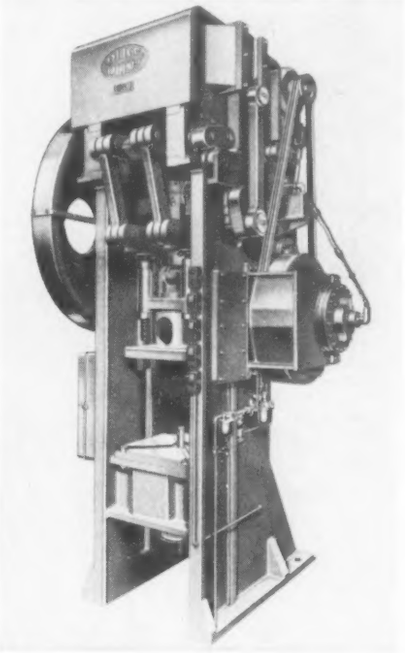


speeds through the use of short piston strokes.

Other features include crankshaft mounting on double row ball bearings, force feed lubrication and individual air cleaners for each low-pressure cylinder. Units are available in industrial departmental, skid, steel wheel, pneumatic-tired trailer, and flanged wheel mountings.

12. Toggle Presses

Featuring steel-weldment construction which results in weight savings and permits reduced floor space requirements, the new line of single crank toggle presses manufactured by E. W. Bliss Co., Detroit, are offered in eight sizes ranging from 4 1/4 to 7 in. shaft diameter and 8 1/2 to 24 1/2-in. stroke length. Press design is for deep drawing operations on steel, brass, copper, aluminum and other metals. Design of toggle driving mechanism provides a cross head with long guides at the position where it is most needed. Clutch is of single-disk type, with one station electric push-button control, and includes airbrake for



stopping the flywheel. Manifold lubrication system has metal tubing leading to each bearing. Drive shaft and flywheel are roller bearing equipped.

13. Safety Goggle

Rubber-frame goggle equipped with a large, single acetate lens and designed to protect workers against chemical and dust hazards is announced by American Optical Co., Southbridge, Mass. It can be worn in combination with the company's R-1000 respirator.

Providing wide-angle vision, good ventilation and wearing comfort, it may be worn directly over the eyes or over most types of prescription glasses. Face-form frame of the goggle is molded from non-irritating, acid-resisting synthetic rubber. Perforations at top and sides of goggle allow ample ventilation to reduce possibility of fogging. Lens are shatter-resistant, slow burning and replaceable.

14. Drill Chuck Selector

Selecting the right drill chuck for any straight shank drill is made easy, according to Scully-Jones & Co., Chicago, who are offering a slide rule type drill chuck selector gratis. With one setting of the selector it is possible to determine the catalog number of the style B drill chuck to be ordered. It also shows recommended speeds and feeds for drilling various types of materials.

15. Shop Tote Truck

Reducing manual effort to a minimum, eliminating stooping, straining or tugging, the new department truck, the Easy-Tote, illustrated here, made by Easy-Tote Products Inc., Arcade, N. Y.,

practically loads itself by utilizing a combination of features including a crank, hook, rigid handle and tilting low base plate. Use of truck consists of three steps: (1) Grasp crank with hook in one

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hand, steadying handle with other, engaging hook on bottom pan. Pulling up on crank rolls the truck toward and under pans which are raised slightly off the floor. (2) Continuing of upward movement of crank locates the load squarely on the base plate, the hook dropping out. (3) Load is then ready to be easily pushed or pulled. Unloading is accomplished by lifting handle, causing load to slide down base plate. Side wheels are roller bearing equipped and full-swiveling caster has antifriction bearings. Base plate clears floor by 2 in. and is large enough to handle standard size tote pans. Fenders on side wheels prevent load from slipping and eliminate wheel interference while moving.

16. Photoelectric Counter

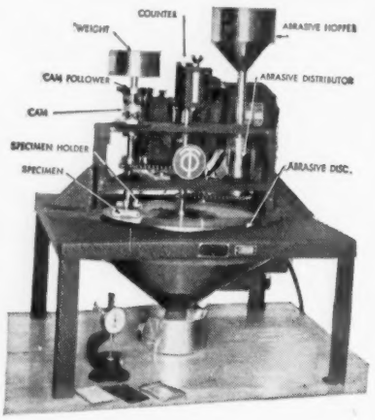
Completely packaged and easily installed, the photoelectric counter type P1, made by Photoswitch Inc., 77 Broadway, Cambridge 42, Mass., consists of

photoelectric control, light source and electric counter. Only equipment required to be located at the point of count is the control and the light souree.

One or more electric counters may be placed at any convenient location and wired to the control. Operating from 115 v 60 cycle ac, unit is capable of counting up to 600 items per minute, Distance between photoelectric unit and light source may be up to 6 ft. Counter runs to 99,999 before resetting to zero by a knob is necessary.

17. Walkaway Material Tester

To meet the need for dependable and accurate tests of walkway materials, the Tinius Olsen Testing Machine Co., 500 North Twelfth street, Philadelphia 23, announces the Wearometer, for de-

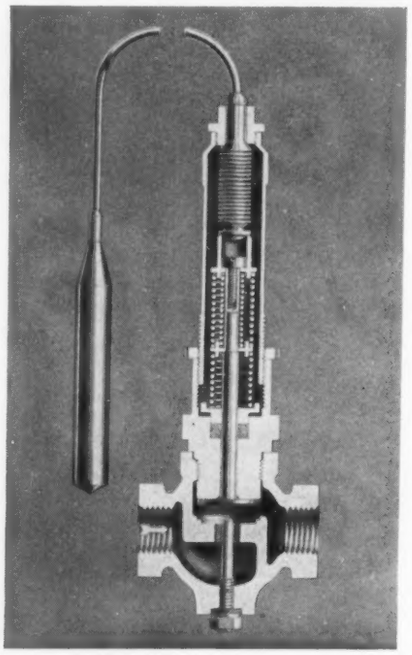


termining surface resistance properties of various products, including plastics, laminates, and paint surfaces. Factors such as speed, amount of lift of specimen, amount, size and kind of abrasive, ratio of specimen shaft speed to abrasive disk speed, size and configuration of specimen and load on the specimen can be modified to give the combination of conditions most closely approximating actual service.

18. Temperature Regulator

Self-contained, direct-operated temperature regulator for gas control to process heating, designated as class MG-2, is announced by Leslie Co., 152 Delafield avenue, Lyndhurst, N. J. Supplied with screwed ends in ⅜, ½ and ¾-in. sizes, the bronze body temperature regulators operate over standard temperature ranges from 20 to 600° F at inlet pressures up to 25 psi maximum.

Designed for hot water heaters, oil



treaters, industrial baking ovens, cookers, drying ovens, steam tables and similar equipment, the regulators have an all-bronze trim, with renewable valve disk and stem assembly.

19. Cut-Out Switch

Centrally located periodic temperature measurements for industrial processing are made possible with the new recorder cut-out switches which are manufactured by Brown Instrument Co., Philadelphia, division of Minneapolis-Honeywell Regulator Co. The cut-out switch consists of a double-pole, double-throw mechanically operated push-button switch for multipoint indicators.

20. Stencil Cabinet

A stencil cabinet for the shipping room is announced by Diagraph-Bradley Stencil Machine Corp., St. Louis. Of heavy gage steel, it is reinforced to hold any size stencil machine. Each of its large side drawers has space for over 600 cut stencils and is equipped with alphabetical dividers. Top of the cabinet is 30 in. from the floor. The clip board at top of cabinet is hinged and has a tension spring so that orders can be slipped under clip.

All sizes of stencil board can be kept in compartments in top of cabinet. Partitions in cabinet bottom are large enough to hold a 5 gal can of stencil ink. Drawers are set on roller bearings.

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Scrap Rises $2.50 as Steel Ingot Output Hits New High

Market forced to basis of $35, Pittsburgh, for heavy melting as mills seek raw materials to sustain operations . . . Steelmaking capacity revised downward to 91,241,250 net tons per year

UNRELENTING pressure for scrap to sustain current high steel production levels, aggravated by continued shortage of pig iron, finally forced the price level up $2.50 per ton for heavy melting steel in many districts last week. The supply situation is made tighter by the scrap trading arrangements between buyers of finished steel and converters. Movement of scrap to mills has been impeded during the last two weeks by adverse weather conditions.

Present rate of scrap consumption is indicated by the fact the estimated national ingot production rate rose further last week to a new postwar high of 93.5 per cent of capacity. This rate is based on revised annual capacity figures just released by the American Iron & Steel Institute. As of Jan. 1, 1947, capacity was 91,241,250 net tons compared with 91,890,560 as of Jan. 1, 1946.

With the outlook encouraging for continued high rate of steel production for several weeks ahead, mills have established second quarter selling quotas at a generally higher level than for the current period. However, they are still substantially short of requirements and in some cases not better than for the present quarter. In fact, in certain instances, where mills have become far oversold and are changing their policies with respect to the acceptance of tonnage, such as is true with some plate producers, the regular trade probably will not receive as much as at present.

Flat-rolled steel continues in critically short supply. Demand is far in excess of current output and consumers are pressing producers from all directions. Consumer allocations based on prewar order volume are falling far short of needs. Additional sheet and strip rolling mill capacity is expected to come into operation over the next few months but no particular easing in the tight supply situation is likely until well on toward the end of the year, if then.

Most, if not all, plate producers are now selling on a quarterly quota basis, some only recently having adopted this policy and in shifting over are cutting their original commitments for the second quarter quite drastically.

Last week the Steel Products Industry Advisory Committee met with Civilian Production Administration officials and a plan was agreed upon whereby steel will be furnished on the critical list of housing products on a voluntary basis by the mills during the second quarter to the extent of 304,000 tons. In first quarter 295,200 tons were earmarked for this purpose. No priorities will be applied and products on the critical list are unchanged.

Pending completion of wage negotiations no particular change in market conditions is expected. Talk of possible reduction in prices accompanying a moderate wage advance are described in the trade as purely speculative. At the moment the market is firm on most products at the higher price levels recently established. In semifinished steel considerable uncertainty prevails as to the exact level of the market due to conversion deals between certain steel buyers and ingot producers.

The advance in the national steel operating rate to 93.5 per cent of capacity was due to advances of 8 points to 92 per cent in Detroit, 6.5 points to 69 per cent in St. Louis, 3 points to 97.5 per cent in Pittsburgh, 2 points to 90 per cent in New England, and 1 point to 92 per cent in Chicago. Against these advances, the rate declined 5.5 points in Cleveland to 91 per cent, 4.5 points in Wheeling to 84.5 per cent and 1 point to 90 per cent in Cincinnati.

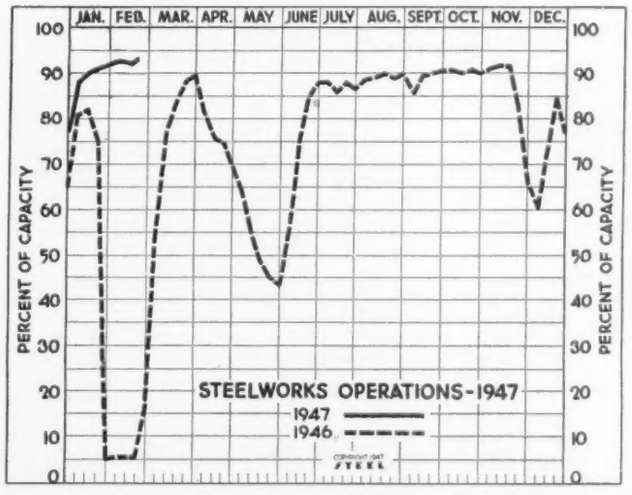
STEEL's composite market averages advanced to $33.75 from $32.08 on steelmaking scrap while holding unchanged at $69.36 on finished steel, $52.10 on semifinished steel, and $29.56 on steelmaking pig iron.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Feb. 15	Change	Same Week 1946	Same Week 1945
Pittsburgh	97.5	+ 3	1.5	84
Chicago	92	+ 1	4.5	99.5
Eastern Pa.	89	None	6	91
Youngstown	89	None	0	89
Wheeling	84.5	— 4.5	56	97.5
Cleveland	91	— 5.5	0	86.5
Buffalo	90.5	None	0	90.5
Birmingham	99	None	0	95
New England	90	+ 2	10	90
Cincinnati	90	— 1	44	96
St. Louis	69	+ 6.5	19	80
Detroit	92	+ 8	32	88
Estimated national rate	93.5	+ 1.5	5.5	93

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.



COMPOSITE MARKET AVERAGES

	Feb. 15	Feb. 8	Feb. 1	One Month Ago Jan., 1947	Three Months Ago Nov., 1946	One Year Ago Feb., 1946	Five Year Ago Feb., 1942
Finished Steel	$69.36	$69.36	$69.36	$69.11	$64.45	$60.91	$56.73
Semifinished Steel	52.10	52.10	52.10	49.20	40.60	39.20	36.00
Steelmaking Pig Iron	29.56	29.56	29.56	29.56	27.50	24.75	23.00
Steelmaking Scrap	33.75	32.08	31.33	31.17	22.22	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Feb. 15, 1947	Jan., 1947	Nov., 1946	Feb., 1946
Steel bars, Pittsburgh	2.60c	2.60c	2.50c	2.375c
Steel bars, Philadelphia	2.98	2.98	2.86	2.695
Steel bars, Chicago	2.60	2.60	2.50	2.375
Shapes, Pittsburgh	2.50	2.462	2.35	2.225
Shapes, Philadelphia	2.64	2.602	2.48	2.340
Shapes, Chicago	2.50	2.462	2.35	2.225
Plates, Pittsburgh	2.65	2.612	2.50	2.375
Plates, Philadelphia	2.85	2.777	2.558	2.425
Plates, Chicago	2.65	2.612	2.50	2.375
Sheets, hot-rolled, Pittsburgh	2.50	2.50	2.425	2.3125
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.275	3.1625
Sheets, No. 10 galv., Pittsburgh	3.55	3.55	†4.05	†3.875
Sheets, hot-rolled, Gary	2.50	2.50	†2.425	†2.3125
Sheets, cold-rolled, Gary	3.20	3.20	3.275	3.165
Sheets, No. 10 galv., Gary	3.55	3.55	†4.05	†3.875
Hot-rolled strip, Pittsburgh	2.50	2.50	2.35	2.225
Cold-rolled strip, Pittsburgh	3.20	3.20	3.05	2.925
Bright basic, bess, wire, Pittsburgh	3.425	3.420	3.05	2.90
Wire nails, Pittsburgh	4.125	4.062	3.75	3.075
Tin plate, per base box, Pittsburgh	$5.75	$5.75	*$5.25	*$5.125

* Nominal. † Base changed in December to 10 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$58.00	$52.25	$38.00	$37.00
Slabs, Pittsburgh, Chicago	51.00	48.00	39.00	37.50
Rerolling billets, Pittsburgh	51.00	48.00	39.00	37.50
Wire rods ¼ to $\frac{9}{32}$-inch, Pitts.	2.675c	2.675c	†2.30c	2.225c

† Base changed in December from 24 gage to 10 gage.

Pig Iron

	Feb. 15, 1947	Jan., 1947	Nov., 1946	Feb., 1946
Bessemer, del. Pittsburgh	$31.83	$31.815	$29.77	$26.94
Basic, Valley	30.00	30.00	28.00	25.25
Basic, eastern del. Philadelphia	32.01	31.99	29.93	27.09
No. 2 fdry., del. Pgh. N. & S. sides	31.33	31.315	29.27	28.44
No. 2 fdry., del. Philadelphia	32.51	32.49	30.43	27.59
No. 2 foundry, Chicago	30.50	30.50	28.50	25.75
Southern No. 2, Birmingham	26.88	26.88	24.88	22.13
Southern No. 2, del. Cincinnati	31.75	31.75	28.94	26.05
Malleable, Valley	30.50	30.50	28.50	25.75
Malleable, Chicago	30.50	30.50	28.50	25.75
Charcoal, low phos., fob Lyles, Tenn.	37.50	37.50	33.00	33.00
Gray forge, del. McKees Rocks, Pa.	30.66	30.65	28.61	25.80
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.00

Scrap

Heavy melting steel, No. 1, Pittsburgh	$35.00	$32.50	$23.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	33.75	31.00	21.90	18.75
Heavy melting steel, Chicago	32.50	30.00	21.75	18.75
Rails for rolling, Chicago	38.50	35.688	24.25	22.25
No. 1 cast, Chicago	42.50	41.25	29.00	20.00

Coke

Connellsville, furnace ovens	$8.875	$8.812	$8.75	$7.50
Connellsville, foundry ovens	9.875	9.812	9.50	8.25
Chicago, by-product fdry., del.	16.10	15.912	15.10	13.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Forging quality, $40, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $52.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $42; Portsmouth Steel Corp., $55-$60. Portsmouth, O. Detroit, del., $45; eastern Mich., $46.

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $50; Detroit, del., $53; eastern Mich., $54.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $64; eastern Mich., $65.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $50; Portsmouth Steel Corp., $66 Portsmouth, O.

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb 2.35c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, ¼ to $\frac{9}{32}$-in., inclusive, $2.55-$2.80 per 100 lb. Galveston base, $2.65. Worcester, add $0.10. San Francisco (base, del.), $3.27.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.60c; Detroit, del., 2.75c; eastern Mich., 2.80c; New York, del., 3.01c; Phila., del., 2.98c, San Francisco (base, del.), 3.33c; Los Angeles (base, del.), 3.325c.

Rail Steel Bars: Price, 2.60c-2.95c, same basing points as merchant carbon bars, except base is 10 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.20c; eastern Mich., 3.25c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.35c; Toledo, 3.40c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 3.80c; Detroit, del., 3.95c; eastern Mich., 4.00c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; Detroit, del., 2.60c; eastern Mich. and Toledo, 2.65c; San Francisco (base, del.), 3.03c; Los Angeles (base, del.), 3.025c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.60c-2.95c; Detroit, del., 2.75c; eastern Mich. and Toledo, del., 2.80c.

Iron Bars: Single refined, Pitts., 6.15c; double refined, 7.00c; Pittsburgh, staybolt, 7.85c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c; Philadelphia, del., 2.70c; New York, del., 2.79c. (Andrews Steel Co., quotes on Middletown, O., base for shipment to Detroit area; Alan Wood Steel Co., Conshohocken, Pa., quotes 3.10c, Sparrows Point Md., base; Granite City Steel Co., 2.875c, fob Granite City, Ill., 2.775c, fob Gary or Birmingham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.20c; Granite City, base, 3.30c; Detroit, del., 3.35c; eastern Mich., del., 3.40c; New York, del., 3.61c; Philadelphia, del., 3.58c.

Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Canton, Middletown, base 3.55c; New York, del., 3.84c; Philadelphia, del., 3.75c.

Corrugated Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, base, 3.55c.

Culvert Sheets, No. 16, not corrugated, copper alloy: Pittsburgh, Chicago, Gary, Birmingham, 4.15c; Granite City, 4.25c; copper iron 4.50c; pure iron, 4.50c.

Aluminized Sheets, No. 20 hot-dipped, coils or cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.55c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.55c; Granite City, base, 3.65c; Detroit, del., 3.70c; eastern Mich., 3.75c.

Electrical Sheets, No. 24: Field: 4.20c, Pittsburgh, Chicago, Gary; 4.30c, Kokomo, Ind. Armature: 4.50c, Pittsburgh, Chicago, Gary; 4.60c, Granite City, Ill., Kokomo, Ind. Electrical: 5.00c, Pittsburgh, Chicago, Gary; 5.10c, Granite City, Kokomo. Motor: 5.75c, Pittsburgh, Chicago, Gary; 5.85c, Granite City. Dynamo: 6.45c, Pittsburgh; 6.55c, Granite City. Transformer 72, 6.95c; 65, 7.65c; 58, 8.35c; 52, 9.15c, Pittsburgh.

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c. (Superior Steel Corp., 3.30c, Pittsburgh).

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.20c; Chicago, base, 3.30c; Detroit, del., 3.35c; eastern Mich., 3.40c; Worcester, base, 3.40c. (Superior Steel Corp., 4.70c, Pittsburgh.)

Cold-Finished Spring Steel, 0.26-0.40 carbon: Pittsburgh, Cleveland, base, 3.20c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0 75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.95, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 3.60c; Granite City, Birmingham, Sparrows Point, 3.70c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4.90; Granite City, Birmingham, Sparrows Point, $5.00.

Roofing Ternes: Pittsburgh base per package 112 sheets: 20 x 28 in., coating I. C. 8-lb $13.50; 15-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.65c; Coatesville, Claymont, Geneva, Utah, 2.80c; New York, del. 2.94c; Phila., del., 2.85c; St. Louis, del., 2.74c; Boston, del., 2.86c. (Central Iron & Steel Co., Harrisburg, Pa., 3.40c, basing points; Alan Wood Steel Co., Conshohocken, Pa., 2.80c, Coatesville and Claymont equivalent.)

Floor Plates: Pittsburgh, Chicago, 3.90c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.787c; Coatesville, 4.15c.

Clad Steel Plates: Coatesville, 10% cladding: nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.50c; Geneva, Utah, 2.65c; New York, del., 2.70c; Phila., del., 2.64c.

(Phoenix Iron Co., Phoenixville, Pa., nominally, 3.05c, Bethlehem, Pa., equivalent.)

Steel Piling: Pittsburgh, Chicago, Buffalo, $3 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer .... *$3.30-$3.55
Spring (except Birmingham) **$4.25

Wire Products to Trade

Nails and Staples
Standard and cement-coated..... †$3.75-$4.50
Galvanized ..... ‡$3.75-$4.50

Wire, Merchant Quality
Annealed (6 to 8 base).. ..... $3.95
Galvanized (6 to 8 base) $4.40
(Fob Pittsburgh, Chicago, Birmingham, per base column)

Woven fence, 15 gage and heavier..... ††84
Barbed wire, 80-rod spool..... ††94
Barbless wire, twisted..... 94
Fence posts ..... ††82
Bale ties, single loop ..... ††86

* Add $0.10 for Worcester, $0.05 for Duluth. San Francisco (base, del.), $4.31 for bright basic only.

** Add $0.10 for Worcester, $0.25 for Duluth and Trenton, N. J San Francisco (base, del.), $5.63 for MB spring wire; $5.28, black premier.

† Add $0.30 Worcester; $0.10 Cleveland. San Francisco (base del.), $4 83.

‡ San Francisco (base. del.), $4.83.

§ Add $0.10 for Worcester. San Francisco (base, del.), $4.96 for annealed; $5.41 galvanized.

†† San Francisco (base, del.) woven fence, 107; barbed wire, 114; bale ties, 110; Duluth, fence posts, 84.

Rails, Supplies

Rails: Standard, over 60-lb. fob mill, $2.50 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $2.85 per 100 lb; light rails (rail steel), $2.95, Williamsport, Pa.
Relaying, 35 lb and over, fob railroad and basing point, $43-$46 per net ton.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30c-6.40c.

Tubular Goods

Standard Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

Butt Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	48	23	½	— 2	+20
¼ & ⅜	51	30½	⅝	—11½	+10
½	55½	41	1-1¼	—17	+ 2
¾	58½	45	1½	—22½	— 1½
1-3	60½	47½	2	—23	— 2

Lap Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
2	53	39½	1¼	— 1	+20
2½-3	56	42½	1½	— 7	+13
3½-6	58	44½	2	—14½	+ 5½
*8	58	42½	2½-3½	—17	+ 1½
*10	57½	42	4	—21	— 4
*12	56½	41	4½-8	—19	— 2½
			9-12	—10	+ 7

* Not T. & C.

Seamless
Steel

In.	Blk.	Gal.	In.	Blk.	Gal.
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

		——Seamless——		—Elec. Weld—	
O.D. Sizes	B.W.G.	Hot Rolled	Cold Drawn	Hot Rolled	Cold Drawn
1"	13	....	$10.89	$10.62	$10.62
1¼"	13	....	12.90	10.59	12.58
1½"	13	$12.00	14.26	11.70	13.90
1¾"	13	13.65	16.23	13.31	15.82
2"	13	15.29	18.17	15.00	17.95
2¼"	13	17.05	20.26	16.71	20.00
2¼"	12	18.78	22.31	18.38	22.00
2½"	12	20.57	24.43	20.11	24.07
2¾"	12	21.80	25.89	21.27	25.46
3"	12	22.87	27.18	22.26	26.68
3¼"	11	26.88	31.94	26.15	31.33
3½"	11	28.86	34.30	28.06	33.64
4"	10	35.82	42.55	34.78	41.68
4½"	9	47.48	56.42	....	....
5"	9	54.96	65.30	....	....
6"	7	84.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine

½-in. and smaller; up to 6 in. in length 55 off
⅝ and ⅝, up to 6 in. in length..... 52 off
¾ x 6 in. ..... 49 off
⅞ and 1 in. x 6 in. length ..... 51 off
1⅛ in. and larger in all lengths and ⅛ in. and larger in lengths over 6 in. 48 off
⅛ in. and smaller, longer than 6 in.... 45 off
Tire bolts ..... 38½ off
Step bolts ..... 46 off
Plow bolts ..... 57 off

Stove Bolts

In packages, nuts separate, 60-10 off; bulk 74 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

	A.S. Light	A. S. Reg. and Heavy
Semifinished hexagon	51 off	....
⅛-in. and smaller.....	....	48 off
⅛-in.-1-in.	48 off	....
⅛-in.-1-in.	....	47 off
1⅛-in.-1½-in.	46 off	45 off
1⅝-in. and larger.....	....	44 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright).... 56 off
Upset (10-35 heat treated)
⅝ x 6 ..... 51 off
⅝, ⅞ & 1 x 6 ..... 47 off

Square Head Set Screws

Upset 1-in. and smaller ..... 61 off
Headless, ¼-in. and larger ..... 46 off
No. 10 and smaller ..... 56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago
Birmingham, Lebanon, Pa.

Structural 5.25c
⅞-inch and under ..... 55-5 off

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl .....$1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	72.49c
1.5	4	1	8.5	58.43c
...	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plates	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301....	26.00c	29.50c	37.00c	22.00c	28.00c
302....	26.00	29.50	37.00	23.50	30.50
303....	28.50	31.50	39.00	29.50	36.00
304....	27.50	31.50	39.00	25.50	32.50
308....	31.50	37.00	44.50	31.00	38.00
309....	39.00	43.50	51.00	40.50	51.00
310....	53.50	56.50	57.50	53.00	61.00
316....	43.50	48.00	52.00	43.50	52.00
321....	31.50	37.00	44.50	32.00	41.50
347....	36.00	41.50	49.00	36.00	45.50
431....	21.00	24.00	31.50	19.00	24.50
440A ..	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403....	23.50	27.00	32.00	23.00	29.50
410....	20.50	23.50	29.00	18.50	24.00
416....	21.00	24.00	29.50	20.00	25.50
420....	26.00	31.00	36.50	26.00	39.50
430....	21.00	24.00	31.50	19.00	24.50
430F...	21.50	24.50	32.00	20.50	27.00
442....	24.50	28.00	35.50	26.00	35.00
443....	24.50	28.00	35.50	26.00	35.00
446....	30.00	33.00	39.50	38.00	56.50
*501...	9.00	13.00	17.50	13.00	18.50
*502...	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304....	....	24.00	22.00	....	....
410....	....	22.00	20.00	....	....
430....	....	22.50	20.50	....	....
446....	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

Metallurgical Coke

Price Per Net Ton
Beehive Ovens

Connellsville, furnace ..... *$8.75-$9.00
Connellsville, foundry 9.75-10.00
New River, foundry..... 11.75
Wise county, foundry..... 9.00- 9.50
Wise county, furnace..... 8.50- 9.00

* Operators of hand-drawn ovens using trucked coal, $9.35-$9.60.

Coke By-Products

Spot, gal, freight allowed east of Omaha
Pure and 90% benzol..... 17.00c
Toluol, two degrees..... 22.00c
Industrial xylol 22.00c
Solvent naphtha 26.00c

Per pound fob works
Phenol (car lots, returnable drums).... 11.25c
Do., less than carlots 12.00c
Do., tank cars 10.25c

Eastern plants, per pound
Naphthalene flakes, balls, bbl, to jobbers, "household use" 9.50c

Per ton, bulk, fob plants
Sulphate of ammonia..... $30.00

PIG IRON

Prices per gross ton. Minimum delivered prices do not include 3 per cent federal tax.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$31.50	$31.00	$32.50	$32.00
Newark, N. J., del.	33.34	32.84	34.34	35.54
Brooklyn, N. Y., del.	34.50	....	....	35.00
Birdsboro, Pa., base	34.50	34.00	35.50	35.00
Birmingham, base	26.88	25.50	31.50	....
Baltimore, del.	33.28	....	....	....
Chicago, del.	31.12	....	....	....
Cincinnati, del.	31.75	30.37	....	....
Newark, N. J., del.	32.96	....	....	....
Philadelphia, del.	32.13	31.63	....	....
St. Louis, del.	30.87	31.79	....	....
Buffalo, base	30.50	30.00	31.50	31.00
Boston, del.	36.98	36.48	37.98	37.48
Rochester, del.	32.34	31.84	33.34	32.84
Syracuse, del.	33.00	32.50	34.00	33.50
Canton, Massillon	30.50	30.00	....	30.50
Chicago, base	30.50	30.00	31.00	30.50
Milwaukee, del.	31.82	31.32	32.32	31.82
Muskegon, Mich., del.	34.33	....	....	34.33
Cleveland, fob furnace	30.50	30.00	31.00	30.50
Akron	32.17	31.67	32.67	32.17
Detroit, base	30.50	30.00	31.00	30.50
Saginaw, Mich., del.	33.67	33.17	34.17	33.67
Duluth, base	31.00	30.50	31.50	31.00
Erie, Pa., base	30.50	30.00	31.50	31.00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	30.50	30.00	31.00	30.50
St. Louis, del.	31.25	30.75	....	31.25
Neville Island, Pa., base	30.50	30.00	31.00	30.50
†Pittsburgh, del., N.&S. sides	31.33	30.83	31.83	31.33
Provo, Utah, base	30.50	30.00	....	....
Sharpsville, Pa., base	30.50	30.00	31.00	30.50
Steelton, Pa., base	31.50	31.00	32.50	32.00
Swedeland, Pa., base	31.50	31.00	32.50	32.00
Philadelphia, del.	32.51	32.01	....	33.01
Troy	31.50	31.00	32.50	32.00
Toledo, O., base	30.50	30.00	34.50	34.00
Cincinnati, del.	34.00	33.50	....	....
Youngstown, O., base	30.50	30.00	31.00	30.50
Mansfield, O., del.	33.48	32.98	33.98	33.48

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Ookmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base).....$38.00
6.51-7.00..$39.00 9.01- 9.50. 44.00
7.01-7.50.. 40.00 9.51-10.00. 45.00
7.51-8.00.. 41.00 10.01-10.50. 46.00
8.01-8.50.. 42.00 10.51-11.00. 47.00
8.51-9.00.. 43.00 11.01-11.50. 48.00

Fob Jackson, O., per gross ton, Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $52.75, Jackson, O.; $56 Keokuk, Iowa; $54, Buffalo and Niagara Falls, N. Y. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.... $37.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $30.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $36, base; Birdsboro, Pa., $39, base; Philadelphia, $38.16, del. Intermediate phosphorus, Central furnace, Cleveland, $33.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky. 65.00
Ala., Ga. 65.00
N. J. 70.00

Intermediate Heat Duty

Ohio 57.00
Pa., Ill., Md., Mo., Ky. 59.00
Ala., Ga. 51.00
N. J. 62.00

Low Heat Duty

Pa., Md., Ohio..... 51.00

Malleable Bung Brick

All bases 75.00

Ladle Brick

(Pa., O., W. Va., Mo.)
Dry Press 42.00
Wire Cut 40.00

Silica Brick

Pennsylvania 65.00
Joliet, E. Chicago..... 74.00
Birmingham, Ala. 65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.
Bulk 22.00
Bags 26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick 54.00
Chem. bonded chrome..... 54.00
Magnesite brick 76.00
Chem. bonded magnesite..... 65.00

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer $5.95
Old range nonbessemer..... 5.80
Mesabi bessemer 5.70
Mesabi nonbessemer 5.55
High phosphorus 5.55

Eastern Local Ore

Cents, units, del. E. Pa.
Foundry and basic 56-63% contract 14.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.... Nom.
N. African low phos..... Nom.
Swedish basic, 60 to 68% 13.00
Spanish, No. African basic, 50 to 60%..... Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro..... 7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid $24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.
(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1 ..... $37.50
48% 3:1 ..... 39.00
48% no ratio..... 31.00

South African (Transvaal)

44% no ratio .....$27-$27.50
45% no ratio..... 28.00
48% no ratio..... 30.00
50% no ratio..... 31.00

Brazilian—nominal

44% 2.5:1 lump..... $33.65
48% 3:1 lump 43.50

Rhodesian

45% no ratio.....$27-$27.50
48% no ratio..... 30.00
48% 3:1 lump..... 39.00

Domestic (seller's nearest rail)
48% 3:1 ..... $39.00

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c per unit less than Metals Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines $0.75

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds.

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	3.85	3.75–3.85	...	...	...
Cold-Rolled	4.55–4.75	4.55–4.75	4.55–4.75	4.75	...	4.55–4.75	...	...	...
Galvanized	5.40	.....	.....	...	...	.....	...	...	...
Strip, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes	4.00	4.00	4.00	4.00	...	4.00	4.00	4.00	4.00

Note: Lower level of quoted ranges represent prices for NAX High Tensile, produced by Great Lakes Steel Corp., Detroit.

WAREHOUSE STEEL PRICES

Base prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. °10G	Gal. °24G	†H-R	C-R	H-R	C-F	H-R Alloy (§4140)	Structural Shapes	Carbon ⅛"-¾"	Floor ⅜" & Thicker
Boston (city)	4.50	....	5.22[4]	6.80[4]	6.80[4]	4.65	6.36	4.62	5.47	7.12	4.47	4.80	6.42
Norfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
††New York (city)	4.42	....	5.27[8]	5.47[5]	....	4.62	....	4.62	5.42	8.42[12]	4.37	4.64	6.35
New York (country)	4.32	....	5.17[8]	5.37[5]	....	4.52	....	4.52	....	....	4.27	4.54	6.25
Baltimore (city)	4.09	6.15[8]	5.65[8]	5.14[5]	6.39[5]	4.40	....	4.45	5.35	....	4.34	4.39	5.90
Baltimore (country)	3.59	6.05[8]	5.55[8]	....	....	....	....	....	4.85	....	4.24	4.29	5.80
Washington (city)	4.35	....	....	5.18[5]	6.43[5]	4.65	....	4.70	5.60[11]	....	4.60	4.65	6.60
Buffalo (city)	4.00	....	4.70[6]	4.35[5]	....	4.30	4.95	4.05	4.95	....	4.05	4.60	5.90
Buffalo (country)	3.90	....	4.60[6]	4.95[5]	....	3.90	4.60	3.95	4.85	6.60	3.95	4.20	5.45
Philadelphia (city)	4.24	5.73[9]	5.33[9]	5.29[5]	6.54[5]	4.43	5.28	4.48	5.38	6.87	4.22	4.40	5.93
Philadelphia (country)	4.14	5.63[9]	5.23[9]	5.19[5]	6.44[5]	4.33	5.18	4.38	....	6.60	4.12	4.30	5.83
Pittsburgh (city)	4.00	5.15[8]	4.70[8]	5.05[5]	6.30[5]	4.00	4.95	4.05	4.95	6.60	4.05	4.30	5.55
Pittsburgh (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.85	3.95	4.85	6.60	3.95	4.20	5.45
Cleveland (city)	4.00	5.15[8]	4.70[8]	5.238[5]	6.488[5]	4.00	5.05	4.05	4.95	6.858	4.311	4.30	5.811
Cleveland (country)	3.90	5.05[8]	4.60[8]	....	....	3.90	4.95	3.95	4.85	....	....	4.20	....
Cincinnati	4.116	5.266[8]	....	5.166[5]	....	4.394	....	4.403	5.303	....	4.444	4.653	5.944
Chicago (city)	4.00	5.15[8]	4.70[8]	5.05[5]	6.30[5]	4.00	5.05	4.05	4.95	6.60	4.05	4.30	5.70
Chicago (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.95	3.95	4.85	6.60	3.95	4.20	5.60
Milwaukee	4.199	5.349[8]	4.899[8]	5.249[5]	6.499[5]	4.199	5.249	4.249	5.149	6.899	4.249	4.499	5.899
Indianapolis	4.04	....	4.84[8]	5.29[5]	6.54[5]	4.24	....	4.36‡‡	5.26	....	4.36	4.61	6.01
St. Paul	4.384[1]	5.534[8]	5.084[8]	5.434[5]	6.684[5]	4.404[13]	....	4.434[13]	5.726[11]	7.084[11]	4.434[13]	4.684[13]	6.084[13]
St. Louis	4.199	....	4.899[9]	....	6.674[5]	4.199	....	4.249	5.324[18]	7.074	3.999	3.999	5.999
Birmingham (city)	3.85[20]	....	....	5.20[5]	....	4.10[20]	....	4.05[20]	5.83	....	4.05	4.30	6.56
Birmingham (country)	3.75[20]	....	....	5.20[5]	....	4.00[20]	....	3.95[20]	....	....	3.95	4.20	....
Los Angeles	5.55	....	7.10[8]	....	8.10[5]	5.65	8.35	5.10	6.90[10]	7.85	5.20	5.20	7.20
New Orleans	4.46°°	....	5.77[8]	....	....	4.83[20]	....	4.78°°	6.14[11]	....	4.68°°	4.83[21]	6.94[26]
Houston, Tex.	4.50[1]	....	....	....	6.00[12]	....	....	4.75[1]	....	....	....	....	....
Oklahoma, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
Omaha, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
San Francisco	4.90§§	....	6.30[5]	....	7.35[5]	5.20[14]	8.35	4.75[14]	°°°	9.35[16]	4.90[14]	5.00[14]	6.80[14]
Tacoma, Wash.	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]
Seattle	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]

Base Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 to 39,999 pounds; cold finished bars, 1000 pounds and over; [1]—any quantity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [5]—450 to 1499 pounds; [6]—one bundle to 1499 pounds; [7]—one to nine bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 39,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over; [13]—400 to14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 49,999; [17]—300 to 9999 pounds; [18]—1500 to 1999 pounds; [19]—1500 to 39,999; [20]—400 to 3999 pounds.

° Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ basing point cities with quotations representing mill prices plus warehouse spread; § as rolled, except New York, Jersey City, Indianapolis and San Francisco where price represents annealed bars; °° add 0.46 for sizes not rolled in Birmingham; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier; °°° rounds under ⅜ in. 7.00c, ⅜ in. and over 6.50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over 6 in. 8.25c.

Open Market Prices of Leading Ferroalloy Products

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $40; Pittsburgh, $44.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140.25 fob cars, Pittsburgh, including 75c switching charge, (where Carnegie - Illinois Steel Corp. is producer); add $8 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.70c; regular, 21.20c; medium, 15.20c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) Prices per lb of briquets: Contract, carlots, bulk 6.40c, packed 6.90c, tons 7.30c, less 7.70c, eastern, freight allowed; 6.65c, 7.15c, 7.90c and 8.30c, central; 7.20c, 7.70c, 9.80c and 10.20c, western; spot up 0.25c; notched up 0.25c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $1.90-$2; contract, $1.88; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V .35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.95c, ton lots 13.45c, smaller lots 13.95c; 80-90%, c.l. 11.35c, ton lots 11.90c, smaller lots 12.45c; 75%, c.l. 10.15c, ton lots 10.75c, smaller lots 11.35c; 50% c.l. 8.45c, ton lots 9.10c, smaller lots 9.75c. Deduct 1.0c for bulk carlots 75%, 80-90%, 90-95%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; less ton lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots.

High carbon, high nitrogen, add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c; add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, less than ton 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, less than ton 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 20.00c, packed 20.15c; ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained Cr; 20.40c, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, less than ton 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched, 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si

60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 13.65c; 2000 lb to c.l., 15.05c; central zone, 14.25c and 17.30c; western; 14.85c and 19.05c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l. 13.15c, 2000 lb to c.l. 14.65c; central, 13.85c and 16.90c; western, 14.45c and 18.65c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb Mn and about ½ lb Si eastern zone, bulk, c.l. 6.15c, ton lots 7.65c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Ferrosilicon: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.20c, ton lots 4.60c, less than ton lots 5c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.35c, ton lots 4.75c, less 5.15c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy, Contract, 5 tons or more $1.90, 1 ton to 8 tons $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; less-ton lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, less 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Prices per lb of alloy, contract, carlots 12.50c, ton lots 13.25c, less 14.00c, eastern zone, freight allowed; 12.80c, 14.35c and 15.10c, central; 12.80c, 16.30c and 17.05c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract or spot, carlots, bulk 12.00c, packed 12.75c; ton lots 13.50c, less 14.25c, eastern zone, freight allowed; 12.30c, 13.05c, 14.60c, 15.35c, central; 12.30c, 13.05c, 16.65c, 17.30c, western.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) Prices per lb of alloy, contract or spot, carlots, bulk 11.75c, packed 12.50c, ton lots 13.25c, less 14.00c, eastern, freight allowed; 12.05c, 12.80c, 16.30c, 17.05c, western.

Zirconium Alloy: 12-15%, per lb of alloy, eastern, contract, carlots, bulk 4.85c, packed 5.30c, ton lots 5.65c, less 6.00c; spot up 0.25c.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.50c, ton lots 15.75c, less 17.00c; spot up 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb 6.25c; ton lots 6.75c; less 7.25c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, less-ton lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 98.8%, $2.60-$2.65, freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% NA_2O; or air dried, 83-85% V_2O_5 and 5.15% NA_2O, $1.10 per lb contained V_2O_5 fob plant freight allowed on quantities of 25 lb and over to St. Louis.

Nonferrous Metal Situation Little Changed

Issuance of production and shipment data on copper and zinc is feature of past week. Demand continues pressing with prices firm

NEW YORK—Except for issuance of production data on the various metals, the nonferrous metal markets were without significant feature last week. Demand continued pressing with prices firm. Uncertainty with respect to supply prospects continue though the copper and zinc production statistics for January showed improvement.

COPPER — Electrolytic continues to be quoted at 20.50c by one custom smelter though bids for No. 1 scrap generally are down to 18.50c. Other sellers continue to quote 19.50c, valley.

Considerable interest is being shown in the various proposals aimed at waiving temporarily the 4-cent import tax.

January domestic production of refined copper was reported at 80,144 tons, which compares with 77,578 tons in December. Deliveries to consumers during the month amounted to 143,692 tons against 141,218 in the preceding month.

ZINC—Little change in market conditions was noted last week. Demand continues well in excess of supply. Prices held firm on the basis of 10.50c, E. St. Louis, for prime western. Increased interest in foreign metal appears to be developing with production of zinc outside this country reported increasing.

Slab production in January totaled 72,332 tons, a slight increase compared with output of 70,176 tons in December. January shipments amounted to 74,795 tons compared with 90,204 in the preceding month. The drop in shipments was not considered particularly significant in view of the active movement of metal late in 1946. Of total January shipments, 67,211 tons went for domestic account and 7584 tons for export and drawback. In December domestic shipments amounted to 77,904 tons while export and drawback tonnage totaled 12,300.

LEAD — Lead supplies are reported improving but consumers generally note little change in conditions. Shipments of refined lead are estimated nearing a rate of 65,000 tons monthly, including government metal. Scrap is in freer supply. Prices held unchanged.

Active demand continues to be encountered with supplies falling short of market needs.

TIN — Office of Temporary Controls last week further relaxed its tin conservation order to permit some additional uses of the metal during the first quarter. Quota restrictions on use of the metal are being eliminated but allocations of pig tin are being continued. It was explained that the quota system limited the amount of tin a consumer could use but the allocation which is continued limits the amount of metal which can be purchased. Previously some companies were allocated more tin during a period than they were permitted to use. Tin control expires Mar. 31, but President Truman has asked Congress for a year's extension.

Representatives of Bolivian tin producers and RFC officials met in Washington within the past few days to discuss a new sales agreement for 1947. Bolivians are reported asking 76.00c per lb of tin contained fob port of shipment, South America. Last year Bolivia exported concentrate exports containing 38,221 metric tons of tin, which compares with 43,147 tons in 1945 and 39,340 in 1944.

During January the Longhorn tin smelter at Texas City, Tex., produced 3024 tons of tin, a slight decline from the 3209 tons produced in December.

ANTIMONY — Supplies continue inadequate with shipments from China irregular. Expectation are 45,000 tons will reach the market this year, of which it is estimated 35 per cent will be derived from scrap. Ordinary grade metal continues to be quoted by leading interests on the basis of 28.25c per lb in bulk, Laredo, Tex., in carlots.

SILVER—Large demand for foreign silver was reported last week in the New York market. Buying was for shipment abroad but the ultimate destination of the metal bought was not disclosed. Domestic consumers of silver also bought on a fair scale with the market firm.

Nonferrous Metal Tonnage Offered at Cleveland

Cleveland — Nonferrous metals including brass and bronze bars and strips, copper strips, lead foil, aluminum bars, sheets, and tubes are now being offered by War Assets Administration at Cleveland in a sealed-bid sale. Divided into 65 lots and weighing a total of 1112 tons, these materials originally cost the government $551,589.

Brass Ingot Output Cut 13 Per Cent During November

Brass ingot production decreased 13 per cent to 29,193 tons in November, according to the Bureau of Mines. Ingot makers consumed 32,789 tons of copper-base scrap in November and purchased approximately the same amount.

Although controls on scrap metal prices were not removed on scrap metal rumors of an impending ceiling removal were rife before that and did not make for an active market. After Nov. 10 there was some hesitancy among both sellers and buyers of scrap, who were waiting for prices to stabilize. Dealers' receipts of copper-base scrap, 33,247 tons, were 15 per cent less than in October and those of the secondary smelters 11 per cent less. Dealers' shipments to consumers in November totaled 36,697 tons.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 19.50c-20.50c, del. Conn.; Lake, 19.62½c, del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 19.25c, refinery, 20,000 lb or more; 19.50c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 20.50c; 88-10-2 (No. 215) 24.75c; 80-10-10 (No. 305) 23.50c; No. 1 yellow (No. 405) 16.25c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Price western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 12.80-12.85c, chemical 12.90c, corroding 12.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 17.00c; No. 12 foundry alloy (No. 2 grade) 16.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 17.00c; grade 2 (92-95%) 16.25c; grade 3 (90-92%) 15.75c; grade 4 (85-90%) 15.50c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 34.00c-38.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straights), 70.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 69.87½c; Grade C, 99.65-99.79% incl. 69.62½c; Grade D, 99.50-99.64% incl., 69.50c; Grade E, 99-99.49% incl. 69.12½c. Grade F, below 99% (for tin content), 69.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 28.25c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 28.75c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $88-$92 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Berrylium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.50 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.55.

Cobalt: 97-98%, $1.50 lb for 550 lb (keg); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 70.75c per ounce.

Platinum: $58-$61 per ounce.

Palladium: $24 per troy ounce.

Iridium: $110 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 19.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 30.93c; Yellow brass 27.53c; commercial bronze, 95% 31.07c, 90% 30.56c; red brass, 85% 29.53c, 80% 29.02c; best quality 28.44c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 35.79c; nickel silver, 18%, 39.82c; phosphor bronze, grade A, 5%, 48.82c.

Rods: Copper, hot rolled 27.28c, cold drawn 28.28c; yellow brass, free cutting, 22.28c, not free cutting 27.22c; commercial bronze, 95% 30.76c, 90% 30.25c; red brass, 85% 29.22c, 80% 28.71c; best quality 28.13c.

Seamless Tubing: Copper 30.97c; yellow brass 30.29c; commercial bronze 90% 32.97c; red brass 85% 32.19c, 80% 31.68c; best quality brass 30.85c.

Copper Wire: Bare, soft, fob eastern mills, carlots 25.52c, less carlots 26.02c; weatherproof, fob eastern mills carlot 26.42c, less carlots 26.92c; magnet, delivered, carlots 28.93c, 15,000 lb or more 29.18c, less carlots 29.68c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Full sheets 16.25c, 140 sq ft rolls; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft.
Pipe: Full coils 15.50c; cut coils 15.75c.
Lead Traps and Bends: List plus 38%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads, 20.00c; 5 tons and over, 25.00c; 1 to 5 tons, 21.00c; less than 1 ton, 21.50c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval, over 15 in., 36.87½c; flat untrimmed, 36.87½c; electro-deposited, 30.62½c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels, nom.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls, 41.50c fob Niagara Falls.

Sodium Cyanide: 96-98%, ½-oz balls, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Cast and rolled carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 30,000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 22.00c.

Tin Anodes: Bar, 1000 lb and over 82.50c; 500 to 1000 lb, 83.00c; 200 to 500 lb, 83.50c; less than 200 lb, 84.00c; ball, 1000 lb and over, 84.75c; 500 lb to 1000 lb, 85.25c; 200 to 500 lb, 85.75c; less than 200 lb, 86.25c, fob Sewaren, N. J.

Tin Chloride: 400 lb bbls, nom., fob Grasselli, N. J.; 100 lb kegs, nom.

Sodium Stannate: In 100 or 200 lb. drums, 49.00c; 4 to 11 kegs, 47.00c; 12 to 20 kegs, 44.30c; 21 kegs and over, 43.50c; in 350-lb bbl, 46.50c; 4 to 5 bbls, 43.80c; 6 bbls and over, 43.00c; fob Chicago, freight allowed east of Mississippi on 100 lb and over.

Zinc Cyanide: 100-lb drums, 35.00c, fob Cleveland; 34.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	17.125	17.125	16.375
Yellow brass	13.750	13.250	12.875
Commercial Bronze			
95%	15.875	15.625	15.125
90%	15.750	15.500	15.000
Red brass			
85%	15.500	15.250	14.750
80%	15.375	15.125	14.625
Best Quality (71-79%)	14.625	14.375	.....
Muntz metal	12.875	12.625	12.125
Nickel silver, 5%	14.500	14.250	7.250
Phos. bronze, A. B.	18.125	17.875	16.875
Naval brass	13.250	13.000	12.500
Manganese bronze	13.250	13.000	12.375

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 16.00, light copper 15.00, composition red brass 16.00, auto radiators 13.00, heavy yellow brass 11.50, brass pipe 12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 18.50c; No. 2 copper, 17.25c; light copper, 16.25c; refinery brass (60% copper), per dry copper content, 15.62½c.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 15.50-16.00; No. 2 14.50-15.00; light copper 13.50-14.00, No. 1 composition red brass 14.00-14.50, No. 1 composition turnings 13.00-13.50, mixed brass turnings 9.50-10.00, new brass clippings 13.00-13.50, No. 1 brass rod turnings 11.75-12.25, light brass 8.00-8.50, heavy yellow brass 10.00-10.50, new brass rod ends 12.00-12.50, auto radiators, unsweated, 11.00-11.50, clean red car boxes 12.50-13.00, cocks and faucets 11.75-12.00, brass pipe 11.50-11.75.

Lead: Heavy lead 11.25-11.50, battery plates 6.50-6.75, linotype and stereotype 13.50-14.00, electrotype 11.50-12.00, mixed babbitt 12.00-12.50, solder joints 13.50-14.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 5.50-6.00, old die cast scrap 4.00-4.50.

Tin: No. 1 pewter 44.00-45.00, block tin pipe 60.00-62.00, auto babbitt 35.00-36.00, No. 1 babbitt 35.00-38.00, siphon tops 38.00-40.00.

Aluminum: Clippings, 2S, 9.50-10.00, old sheets 7.50-8.00, crankcases 7.50-8.00, turnings 3.00, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.50, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

*PITTSBURGH:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling	35.00
Nos. 1, 2 & 3 Bundles	35.00
Machine Shop Turnings	28.50-29.50
Mixed Borings, Turnings	28.50-29.50
Short Shovel Turnings	30.00-31.00
Cast Iron Borings	29.00-30.00
Bar Crops and Plate	37.50-38.00
Low Phos. Cast Steel	37.50-38.00
Punchings & Plate Scrap	37.50-38.00
Elec. Furnace Bundles	36.00-36.50
Heavy Turnings	34.00-34.50
Alloy Free Turnings	34.00-34.50
Cut Structurals	37.50-38.00
No. 1 Chemical Borings	33.50-36.50

Cast Iron Grades

No. 1 Cupola	44.00-45.00
Charging Box Cast	38.00-38.50
Heavy Breakable Cast	35.50-36.50
Stove Plate	39.00-40.00
Unstripped Motor Blocks	40.50-41.50
Malleable	42.50-43.50
Brake Shoes	34.00-34.50
Clean Auto Cast	42.00-43.00
No. 1 Wheels	40.00-41.00
Burnt Cast	35.00-36.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00
R R Malleable	41.50-42.00
Axles	40.00-41.00
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under	41.00-42.00
Rails, 18 in. and under	42.00-43.00
Railroad Specialties	39.00-40.00
Uncut Tires	38.50-39.50
Angles, Splice Bars	41.00-42.00

* Prices for steelmaking grades from remote points range up to $38, including $7 to $8 freight.

CLEVELAND:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt Steel	32.50
No. 1 Busheling	32.50
Nos. 1 & 2 Bundles	32.50
Machine Shop Turnings	26.00
Mixed Borings, Turnings	26.00
Short Shovel Turnings	26.00
Cast Iron Borings	26.50
Bar Crops and Plate	35.00
Cast Steel	35.00
Punchings & Plate Scrap	35.00
Elec. Furnace Bundles	33.50
Heavy Turnings	30.00
Alloy Free Turnings	28.50
Cut Structurals	35.00
No. 1 Chemical Borings	29.50

Cast Iron Grades

No. 1 Cupola	43.00-45.00
Charging Box Cast	41.00-42.00
Heavy Breakable Cast	40.00-41.00
Stove Plate	39.00-40.00
Unstripped Motor Blocks	42.00
Malleable	44.00-46.00
Brake Shoes	30.00
Clean Auto Cast	45.00
No. 1 Wheels	38.00
Burnt Cast	34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50
R. R. Malleable	45.00
Rails, Rerolling	35.00-36.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under	39.00
Railroad Specialties	30.50
Uncut Tires	36.50
Angles, Splice Bars	28.50

VALLEY:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Bundles	35.00
Machine Shop Turnings	27.50-29.00
Short Shovel Turnings	30.00
Cast Iron Borings	29.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00

MANSFIELD:

Machine Shop Turnings	$26.00
Short Shovel Turnings	28.00

CINCINNATI:

No. 1 Heavy Melt. Steel	$32.00
No. 2 Heavy Melt. Steel	32.00
No. 1 Busheling	32.00
No. 1 Bundles	32.00
No. 2 Bundles	32.00
Machine Shop Turnings	25.00
Mixed Borings, Turnings	23.00
Short Shovel Turnings	26.00
Cast Iron Borings	24.00

Cast Iron Grades

No. 1 Cupola Cast	41.00
Charging Box Cast	35.00
Heavy Breakable Cast	35.00
Stove Plate	31.00
Unstripped Motor Blocks	32.00
Brake Shoes	28.00
Clean Auto Cast	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00
R.R. Malleable	38.00
Rails, Rerolling	37.00
Rails, Random Lengths	37.00
Rails, 18 in. and under	40.00

DETROIT:

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$28.50-29.00
No. 1 Busheling	28.50-29.00
Nos. 1 & 2 Bundles	28.50-29.00
No. 3 Bundles	26.50-28.00
Machine Shop Turnings	21.50-22.00
Mixed Borings, Turnings	21.50-22.00
Short Shovel Turnings	21.50-24.00
Cast Iron Borings	21.50-24.00
Punchings & Plate Scrap	30.00-32.00
Elec. Furnace Bundles	32.00

Cast Iron Grades

No. 1 Cupola Cast	$37.00-39.00
Heavy Breakable Cast	30.00-32.00
Clean Auto Cast	37.00-39.00

BUFFALO:

No. 1 Heavy Melt. Steel	$32.00-34.00
No. 2 Heavy Melt. Steel	30.00-32.00
No. 1 Busheling	30.00-32.00
Nos. 1 & 2 Bundles	30.00-32.00
No. 3 Bundles	28.00
Machine Shop Turnings	20.50-21.50
Mixed Borings, Turnings	20.50-21.50
Short Shovel Turnings	22.00-23.00
Cast Iron Borings	21.50-22.50
Cast Steel	27.00
Punchings & Plate Scrap	33.00-34.00
Elec. Furnace Bundles	28.50
Heavy Turnings	22.50
Alloy Free Turnings	23.00
Cut Structurals	28.50
No. 1 Chemical Borings	22.75

Cast Iron Grades

No. 1 Cupola Cast	35.00-40.00
Charging Box Cast	31.00-35.00
Stove Plate	33.00-38.00
Malleable	34.00-38.00
Clean Auto Cast	38.00
No. 1 Wheels	32.75-33.25

PHILADELPHIA:

No. 1 Heavy Melt. Steel	$33.50-34.00
No. 2 Heavy Melt. Steel	33.50-34.00
No. 1 Busheling	33.50-34.00
Nos. 1 & 2 Bundles	33.50-34.00
No. 3 Bundles	31.00-31.50
Machine Shop Turnings	25.50-26.00
Mixed Borings, Turnings	25.50-26.00
Short Shovel Turnings	27.00-27.50
Cast Iron Borings	25.50-26.00
Bar Crops and Plate	36.00-36.50
Cast Steel	36.00
Punchings & Plate Scrap	36.00-36.50
Elec. Furnace Bundles	35.00
Heavy Turnings	34.00-35.00
Cut Structurals	36.00-36.50
No. 1 Chemical Borings	31.50-32.00

Cast Iron Grades

No. 1 Cupola Cast	45.00-46.00
Charging Box Cast	44.00-44.50
Heavy Breakable Cast	43.50-44.00
Unstripped Motor Blocks	41.50
Malleable	46.00-47.00
Clean Auto Cast	45.00-46.00
No. 1 Wheels	45.00-46.00

NEW YORK:

(Dealers buying prices, fob shipping points)

No. 1 Heavy Melt. Steel	$30.00-30.50
No. 2 Heavy Melt. Steel	30.00-30.50
No. 1 Busheling	30.00-30.50
Nos. 1 & 2 Bundles	30.00-30.50
No. 3 Bundles	28.00-28.50
Machine Shop Turnings	22.00
Mixed Borings, Turnings	22.00
Short Shovel Turnings	24.00
Punchings & Plate Scrap	32.00
Elec. Furnace Bundles	31.00
Cut Structurals	32.00
No. 1 Chemical Borings	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	39.50-40.00
Charging Box Cast	37.50-38.00
Unstripped Motor Blocks	34.50
Malleable	40.00-41.00

BOSTON:

(Fob shipping points)

No. 1 Heavy Melt. Steel	$29.00-30.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Busheling	28.00-29.00
Nos. 1 & 2 Bundles	28.00-29.00
No. 3 Bundles	25.00-26.00
Machine Shop Turnings	21.00-22.00
Mixed Borings, Turnings	20.00-21.00
Short Shovel Turnings	23.00-24.00
Cast Iron Borings	20.00-21.00
Bar Crops and Plate	29.35
Cast Steel	29.35-29.85
Punchings & Plate Scrap	29.35-29.85
Elec. Furnace Bundles	29.35
Heavy Turnings	26.35
Alloy Free Turnings	25.35
Cut Structurals	28.85
No. 1 Chemical Borings	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Charging Box Cast	36.00-38.00
Heavy Breakable Cast	42.00-44.00
Stove Plate	39.00-40.00
Clean Auto Cast	38.00-40.00

CHICAGO:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt. Steel	32.50
Nos. 1 & 3 Bundles	32.50
No. 3 Bundles	30.50
Machine Shop Turnings	27.00-28.00
Mixed Borings, Turnings	27.00-28.00
Short Shovel Turnings	28.00-29.00
Cast Iron Borings	28.00-29.00
Bar Crops and Plate	35.00
Cast Steel	35.00
Punchings	35.00
Elec. Furnace Bundles	33.50
Heavy Turnings	32.00
Cut Structurals	35.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-45.00
Malleable	40.00-45.00
Clean Auto Cast	35.00-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.50
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	37.00-38.00
Rails, 3 ft. and under	40.00-41.00
Rails, 18 in. and under	41.00-42.00
Railroad Specialties	37.00-39.00
Angles, Splice Bars	36.00-38.00

ST. LOUIS:

No. 1 Heavy Melt. Steel	$32.25-33.00
No. 2 Heavy Melt. Steel	32.25-33.00
Machine Shop Turnings	27.25-27.75
Short Shovel Turnings	29.25-29.75

Cast Iron Grades
(Fob shipping point)

No. 1 Cupola Cast	35.00-37.00
Charging Box Cast	30.00-35.00
Heavy Breakable Cast	30.00-32.00
Stove Plate	29.00-34.00
Brake Shoes	28.75-31.00
Clean Auto Cast	35.00-37.00
No. 1 Wheels	34.50-36.50
Burnt Cast	25.00-30.00

Railroad Scrap

R.R. Malleable	41.00-42.00
Rails, Rerolling	40.00-42.00
Rails, Random Lengths	37.00-40.00
Rails, 3 ft. and under	40.00-43.00
Uncut Tires	34.50-36.50
Angles, Splice Bars	37.00-38.00

BIRMINGHAM:

No. 1 Heavy Melt. Steel	$29.00-29.50
No. 2 Heavy Melt. Steel	29.00-29.50
No. 1 Busheling	29.00-29.50
Nos. 1 & 2 Bundles	29.00-29.50
No. 3 Bundles	27.50-28.00
Machine Shop Turnings	21.00-21.50
Mixed Borings, Turnings	23.00-23.50
Short Shovel Turnings	23.00-23.50
Cast Iron Borings	21.00-21.50
Bar Crops and Plate	31.00-31.50
Punchings & Plate Scrap	31.00-31.50
Cut Structurals	31.00-32.50
No. 1 Chemical Borings	21.00-21.50

Cast Iron Grades

No. 1 Cupola Cast	37.50-38.00

Railroad Scrap

No. 1 R.R. Heavy Melt	29.50-30.00
R.R. Malleable	37.50-38.00
Rails, Rerolling	33.00-33.50
Rails, Random Length	30.00-30.50
Rails, 3 ft. and under	32.50-33.00
Rails, 18 in. and under	33.50-34.00
Angles and Splice Bars	33.50-34.00

SAN FRANCISCO:

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Busheling	19.50
Nos. 1 & 2 Bundles	19.50
No. 3 Bundles	10.00
Machine Shop Turnings	8.00
Bar Crops and Plate	18.00
Cast Steel	18.00
Alloy Free Turnings	8.00
Cut Structurals	20.00-20.50
Tin Can Bundles	17.00

Railroad Scrap

Axles	26.50
Rails, Random Lengths	21.00
Uncut Tires	23.00

SEATTLE:

No. 1 Heavy Melt. Steel	$19.00
No. 2 Heavy Melt. Steel	19.00
No. 1 Busheling	19.00
Nos. 1 & 2 Bundles	19.00
No. 3 Bundles	17.00
Machine Shop Turnings	11.50
Mixed Borings, Turnings	11.50
Punchings & Plate Scrap	21.50
Cut Structurals	21.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast	22.50
Heavy Breakable Cast	21.50
Stove Plate	25.50
Unstripped Motor Blocks	21.50
Malleable	27.50
Brake Shoes	27.50
Clean Auto Cast	27.50
No. 1 Wheels	24.00

Railroad Scrap

No. 1 R. R. Heavy Melt	20.00
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Sheets, Strip . . .

Ordnance shops may seek priorities to obtain flat-rolled material

Sheet & Strip Prices, Page 136

Boston — Most inquiries for sheet and strip steel emanating from Springfield, Mass., arsenal and other ordnance shops are not finding takers. Few or no tenders are received and those submitted are frequently rejected as not meeting delivery or other requirements. Repeated efforts to buy sheets for containers for the storage of hundreds of thousands of carbines are unsuccessful to date.

One inquiry includes 1384 tons, 14 gage hot-rolled and 18 gage cold-finished sheets, involving much shearing to size and specifying deliveries to start in September and continuing through February, 1948. Part of the tonnage is to be dull finished and some pickled and oiled. Two tenders were submitted at the last opening, but both were rejected. Original specifications are revised sometimes, such as eliminating of No. 4 round edge, reduction of shearing with other minor changes in efforts to attract mill quotations. Purchasing officials ask mills to bid on part and also reasons for not filling tenders, pointing to extension of deliveries. Most mills reply against making firm commitments so far ahead under current escalator clauses and point out mill space is taken up for three months or more. Arsenal officials, as a final resort, indicate the matter of supplying this and other flat-rolled material will be referred to the Office of Temporary Controls for a priority rating if wanted tonnage is not forthcoming.

While this supply problem for the arsenal is an extreme case, the situation also illustrates tightness in flat-rolled steel and the difficulty private industry is experiencing in placing volume beyond limited quotas. Paradoxically, there is more talk of scattered lots of sheets, some in fairly large lots, being offered at premium prices by brokers (9.50c and even up to 14.00c a pound for some grades and finishes). Actual purchases at premiums appear to be limited.

First shipments of tack plate by the new producer, Apollo Steel Co., Apollo, Pa., have been made to this territory at a reported price of 7.00c a pound, basing point.

New York — Most sheet producers have now set up their quotas for the second quarter, and while a few assert that their average allotments are a little heavier than those now being shipped, there appears to be no marked overall improvement. In fact, certain of the larger producers claim their position is more stringent than ever. One large seller reports that quotas on cold-rolled sheets and galvanized sheets for next period are about the same as for the current quarter, but that those on hot-rolled sheets are definitely smaller.

Philadelphia — Sheet producers do not know yet what to expect with regard to housing requirements in the second quarter. However, some have gone ahead without allowances for these special requirements, which means that quotas for a number of their regular customers, as they now stand, are appreciably above present allotments, subject to subsequent revision.

Chicago — Sheetmakers report that first quarter is developing as the most difficult yet experienced. Customers are clamoring for all varieties of sheets, and even increased allotments. Shipments are running well behind schedule and little headway is being made in working down the backlog accumulated through the coal strike. Some consumers, who suffered from the withdrawal of an eastern mill from this district and unable to find new supply sources, are understood to have been obliged to protect their manufacturing operations by continuing with the former source on an fob mill basis.

Cincinnati—Sheet mills in this district were forced to curtail output slightly by recent cold waves. The principal losses were in finishing operations. Steel output was maintained. With the first quarter about half gone, it becomes apparent that once again mills will have considerable carryover into next quarter, although this tonnage will be much less than on Jan. 1. Mills have also assumed a share in the voluntary allotment for a freight car program.

Birmingham—Clamor for sheets is as great as ever and mills are working on second quarter quotas and indications are that tonnage will continue considerably short of needs. Self imposed allocations are continuing but nothing has been said thus far as to probable distribution for the second quarter. Indications are that a sizeable carry-over will be in evidence.

St. Louis—Sheet output here was curtailed somewhat last week by a gas shortage which forced reduction in industrial consumption. The leading producer was able to shift to coal. Some foundries, however, laid off up to half their forces. The third of three new DPC furnaces is on and prospects for reducing the 7 to 8 month lag on deliveries are good. A new cold rolling mill is due in operation in May which will equalize the area's rolling capacity with pouring capacity. Order books for 1947 still remain closed.

Steel Bars . . .

Bar Prices, Page 136

New York — Hot carbon bar quotas, as recently set up by leading producers for second quarter, show little variation from those for the current quarter quotas, especially with respect to the smaller sizes. However, on cold drawn carbon bars, on sizes ranging from ⅝ to 3½ inches diameter, the tendency is easier, with noticeably more tonnage available for shipment next quarter than at present. Only in extremely small rounds and in the flats and hexagons (the latter two irrespective of size) is the situation continuing extremely tight. Also certain of the larger cold drawers, who heretofore have been on a quarterly quota basis, are now inclined to book tonnages into the second quarter and beyond, as well as the first. They are doing this in meeting the competition of various small cold drawers, on attractive specifications.

Boston—Extra for killed-steel bars, 3-in. and over, has been revised and is not mandatory for some application. Short length limitation also has been changed to 5 ft. from 2 ft. Furthermore, pressure on bar extras is possible once supply approximates demand. One leading warehouse has reinstated orders for merchant quality bars, 2 in. and under, and is cancelling orders for special bar quality placed originally with a view of possible better delivery. This is not forthcoming and old orders are being re-entered. Carbon bar quotas in small sizes are held below consumer requirements in most instances, but supply of alloys and larger rounds, squares and flats is in better balance. Bar users estimate steel costs have increased $12 a ton or more, depending on grades required.

Philadelphia—While hot-rolled carbon bar consumers will not get the quotas in the second quarter that they desire, most of them will get at least as much as they are receiving in the current quarter on the smaller sizes and a little more on diameters running over 1½ in. This will not be true in all cases, for the situation varies with the mills, but on an average this would appear to be correct. Moreover, the situation, it appears, will be little easier in cold-drawn carbon bars, excepting for flats and hexagons and the very small sizes of rounds. Alloy bars will remain in as easy position as ever, with hot alloys available for delivery within six to seven weeks at the outside and cold alloy schedules a little more extended.

Seattle — Bar mills are unable to accept all the business offered since they are unwilling to take chances on commitments in view of the scrap shortage and other unfavorable factors. Regular customers are given preference. Jobbers and warehouses are buying merchant bars in steady volume.

Wire . . .

Wire Prices, Page 137

Chicago—Demand for most merchant wire products continues very strong, with consumers seeking increased quantities. Heading the products list are small and medium nails, steel fence posts, bale ties and baling wire. Consumers are reported favorable to the reduced number of standard nail sizes. For manufacturers wire, demand from the heavier industries and furniture trade is substantial. Few cancellations are being received except for some mill supply items and small goods. Inquiries for wire rope have picked up some, especially among equipment manufacturers. It would appear that the large amount of war surplus has affected demand upon wiremakers.

Boston — An increasing number of fine wire specialties are affected by lack of rods in specifications applicable to production of finished material. Meanwhile, most wire consumers are pressing for larger quotas without much success. Expansion in finishing capacity by rod producers and selective selling continues to be a hampering factor in the supply of nonintegrated mills with semifinished material. Demand for resulphurized basic steel is at a high level. There are a few exceptions to overloaded demand, including rope which is available for April delivery and welding wire in most grades, including stainless.

Birmingham—Considerable pressure is being exerted by users of manufacturers wire, but there is slim chance for any real improvement in deliveries and allocated tonnages. Jobbers report they are virtually bare of wire fencing and nails, even though weather conditions normally would have cut deeply into such requirements.

Memphis, Tenn. — Tennessee Coal, Iron & Railroad Co. has the contract for

662½ tons, 7/16-in., seven-wire uncoated steel wire strand at 10.43c per pound fob Bridge Junction, Ark., for the U. S. engineer, Memphis, Tenn. This is the balance of 1000 tons recently placed, 675,000 pounds going to Bergen Wire Rope Co., Lodi, N. J., at 10.00c per pound.

Structural Shapes . . .

More construction projects delayed due to high costs of materials and labor

Structural Shape Prices, Page 137

Boston—Two structural steel projects have been postponed or modified as to the extent building will proceed at this time with high costs of materials and labor a factor. A power plant for Connecticut Light & Power Co., Stamford, Conn., is included for which 1200 tons were about to be placed with a southern fabrication shop. Children's Hospital, Boston, also has been postponed. Contract for the steel had been placed with Bethlehem Fabricators Inc., Bethlehem, Pa., and work started on the fabrication.

Contract-engineers are more critical of escalator clauses, indicating firm prices for steel and other materials are desirable. On the other hand, structural fabricators with tonnage contracts operate on a risk contingency of three to four months normally and longer currently. Most of these interests are unwilling to go to firm prices under these conditions.

The car building program will cut into the plain material supply in car section sizes from the second quarter on. Some warehouses report plain structurals coming in from some mills in slightly heavier volume, although fabricators are seeking an increase in quotas.

Philadelphia — While arrearages in shapes are not as heavy as in some lines, at least two leading producers, in setting up quotas recently for the second quarter, passed up April so as to be able to devote that period to the working off of current quarter's carryover tonnage. A third producer is in a still tighter position, due particularly to operating difficulties resulting from shortage of raw materials. Meanwhile, structural shops, with an average backlog of six months or so and having continued difficulty in rounding out their steel requirements, are still pursuing a selective policy in estimating new work, even though there is far less to choose from than a year ago, prior to government restrictions on nonhousing construction, although somewhat more than recently. At present there is an apparent easing on nonhousing restrictions. In this district, for the period from Jan. 31 to Feb. 6, approval was granted by CPA on 37 projects, having a total valuation of $1,646,362, while denying permission to go ahead on 11 projects, having a total valuation of $252,517.

Recently structural inquiries have been somewhat more numerous, although generally small and mostly representing additions and repairs. However, public bridge work is more lively, with at least two new projects of fair size added to several already pending for Pennsylvania, and a 4000-ton women's dormitory at Penn State College, State College, Pa., has been readvertised, with bids opening Feb. 24. On the other hand, actual awards are light.

Shape production in January is estimated at around 375,000 tons, and might have been slightly higher. This compared with about 325,000 tons in December, 390,000 tons in November and more than 420,000 tons in October, the postwar peak to date.

New York — Few structural awards are noted here, although inquiry continues to accumulate, with 1400 tons for an apartment at 69th St. and Park Ave. and 1000 tons for a school in Queens outstanding. There is still considerable delay in going ahead with many jobs, not only because of government restrictions on nonhousing work, but because of extremely high labor costs and uncertainty as to delivery of materials.

Chicago — While a few awards for structural steel are announced each week, new inquiry is very light. Fabricators are working up to the limit of the steel they are able to obtain from mills, nevertheless, they wonder about the lack of new inquiry. Although shape mills are producing at high level and will continue to do so for some months, barring labor difficulties, fabricators figure that the new railroad car building program is going to result in diversion of considerable tonnage.

Birmingham—Reports in trade circles indicate backlogs in shapes are being reduced, but this is attributable largely to the fact that cost estimates on several major projects have been exceeded, in some cases as much as doubled. Excessive costs have slowed down demands considerably.

Seattle — Fabricating plants are operating at as high a rate as restricted deliveries of steel will permit. Allocations are below requirements and shops do not expect normal supplies until late in the year. Inventories are extremely low. Inquiry is fairly active but several major projects are in the indefinite stage because of inability of plants to bid.

Pacific Car & Foundry Co., Seattle, is furnishing 250 tons of shapes for the Crown-Zellerbach paper plant at Camas, Wash., and 100 tons for a cement plant addition at Bellingham, Wash.

Plates . . .

Plate Prices, Page 137

Philadelphia — Plate production in January, according to reliable estimates, ran around 500,000 tons, compared with about 435,000 tons in December, when the coal strike disrupted output, and close to 530,000 tons in November. As February is a short month, production in the current period should be off about 10 per cent, it is figured. Cold weather over the past two weeks severely hampered production at Coatesville, Pa. Ingot output was sustained by conversion from gas to fuel oil, but certain steps in the finishing operations were dependent on gas and, with supply of this fuel adversely affected, output of finished plates was curtailed. Current situation, however, is easier.

New York — Tank fabricators report a further decline in public work, because of costs which in many instances exceed appropriations. There also is a decline in commercial inquiry, although much tonnage is still being offered, and in general plate fabricators are booked ahead anywhere from 12 to 16 months.

Shortage of plates continues pronounced, but some tank fabricators are able to maintain operations at fairly high rate, at least 75 to 80 per cent of normal capacity, and are not handicapped too greatly, except on certain special jobs, by the shortage of steel. Certain trade leaders look for present stringency in plates to continue for another nine to ten months, but anticipate a material easing after that provided plate production can be sustained at a high rate. Others look for an appreciable easing before that, possibly by next summer, provided production holds up.

Boston — Some easing is noted in heavier plates, 1-in. and thicker, as reflected in substantial shipments to weldment shops after delivery lags growing out of production losses due to restricted production in the fourth quarter. Weldment consumers are active with good backlogs. In lighter tank gages, demand is heavy and fabrication shops are not reaching planned schedules because of shortages; the same applying to most industrial consumers taking lighter gages. Universal plates are further pinched by car building requirements with allocations for that program somewhat out of balance as to distribution of this tonnage.

Birmingham—While a shortage continues in all specifications, the real worry in plates seems to be centered about a lack of the lighter gages, one reason for recent slacking off in operations at the Pullman-Standard Car Mfg. Co.'s Bessemer, Ala., plant. Railroad requirements and needs of tank manufacturers are major contributors.

Seattle — Plate supplies are well below demand and plants report inventories extremely low. Plant operations are less than maximum capacity for this reason and, consequently, bidders are cautious in commiting themselves on contracts which specify deliveries. Small tanks are in strong demand while boiler work has increased with the opening of seasonal activity in fishing, logging and other industries.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 136

Pittsburgh — Output of reinforcing bars is greater than recorded during closing months of last year, and is estimated to be about comparable with average monthly production rate during 1939. However, demand is more than double that experienced in 1939 with result many new inquiries must be rejected. Inability to accurately estimate labor and material costs, plus extended mill deliveries, have discouraged initiation of a number of contemplated expansion programs. Since discontinuance of price control, one large interest reports a leveling off in the downward trend in steel allotments for concrete bar output. Carnegie-Illinois Steel Corp. is no longer shipping into Baltimore and Washington, D. C., districts, and is not meeting the Detroit arbitrary delivered price base of 2.60 per 100 pounds because of the freight absorption involved on these shipments.

Chicago — The reinforcing trade has settled down to a very low volume of business except in the smaller jobs. Inquiries for just a few tons are numerous and are being booked, but projects involving a few hundreds of tons are appearing infrequently. Largest award for some time is 2600 tons for the Dearborn

St. subway, but this has been pending since last August and was held up until last week because of high cost of the project.

Seattle — Despite postponement of many construction projects because of unexpectedly high prices, reinforcing bar orders are pouring into local rolling mills in large volume. Nettleton & Baldwin, this city, and Henry George & Sons, Spokane, Wash., are low at $3,772,785 for three Washington State College buildings at Pullman, Wash. Additional funds will be asked of the legislature as only $3 million are available. This project involves 1000 tons of reinforcing. University of Washington, Seattle, structures will require 900 tons with bids due Mar. 4.

Bethlehem Pacific Steel Co. has booked 2000 tons of reinforcing bars for an unstated project in the Columbia basin, 1200 tons for an expansion of the Hanford atomic plant, and miscellaneous small orders approximating 500 tons. Bids are in for several Washington state highway jobs, involving 100 tons of reinforcing.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 137

New York — Most leading sellers of bolts and nuts are out of the market completely on sizes ½-inch and smaller, where heavy demand has built up backlogs of six months and longer on the present basis of operation. On the larger sizes, average backlogs are around three to four months and, consequently, makers are still accepting orders.

Bolt and nut sellers continue to complain about shortage of steel, adding that their production could be stepped up appreciably if more tonnage were available.

Tin Plate . . .

Tin Plate Prices, Page 137

Washington—The United States has completed arrangements with the Belgian government for 65 million pounds of palm oil, an irreplaceable requirement in manufacture of tinplate, terneplate, wiredrawing and die-forming, a Department of Agriculture official reported to a House committee last week.

Rails, Cars . . .

Track Material Prices, Page 137

New York — While car buying this month got off to a good start with the previously reported placing of 4000 freight cars by the Baltimore & Ohio, there has been little outstanding since then. However, various sizable lists are being estimated and some car builders look for February business to be among the best in recent months. There has been some delay pending clarification as to what the producers of car steel would be able to promise in the way of deliveries over coming months, but this matter is getting straightened out with indications that they will be able to supply enough steel for 7000 cars a month and also an additional 20,000 to 25,000 tons for car repairs, the latter being considered highly important inasmuch as it will get many badly needed cars back into operation quickly.

Southern Foundries Seek Court Order To Check Flow of Pig Iron Into Housing

Birmingham — Southern foundry interests, backed by the Chamber of Commerce and other civic groups prepared last week to seek a federal court injunction prohibiting blast furnace interests from complying with the directive issued by the Civilian Production Administration under which approximately 96 per cent of southern pig iron is being channeled into the Veterans Housing Program.

Scarcity of pig iron has resulted in a reduction in some of the district's most essential operations to part time. Complete shutdown of foundries which are not eligible to receive priorities assistance in obtaining pig iron is underway. Wholesale closing of industries dependent upon foundries also has started in this district. Estimates are that only about 4500 tons of "free" iron a month are available in the south under the CPA certification plan.

Under direction 13 to the steel order M-21, foundries which have orders for railroad brakeshoes or for any of the housing products listed in the direction may obtain preference by certifying to this effect in applying to their suppliers for pig iron to be shipped in the first three months of 1947. It is claimed by the industry here that 96 per cent of southern iron is allocated as against only 23 per cent of northern iron.

The wide variation in the amount of iron allocated is due to the concentration of most soil pipe foundries in the South. At a recent meeting in Washington of the Joint Cast Iron Soil Pipe Industry Advisory Committee with government officials, continued allocation of pig iron was urged to assure high levels of soil pipe production. Most committee members said they had been unable to obtain adequate quantities of scrap iron, and saw the need for continued government assistance on pig iron to offset this shortage of usable scrap.

Producers also recommended elimination of the percentage restriction on production of larger sizes of cast iron soil pipe. The CPA Veterans' Housing Program order No. 4 required producers to make at least 93 per cent of their monthly production of cast iron soil pipe and fittings in sizes under 5 inches in diameter. An increased demand for larger sizes of this pipe has become apparent as the result of stress on multi-dwelling rental housing construction this year under the housing program, and in the increase in CPA's nonhousing construction authorizations to an average of $50 million weekly. The suggested change would not cause any loss in production of smaller sizes, producers said, since they would use facilities which are now idle to make larger sizes.

Pig Iron . . .

Pig Iron Prices, Page 138

Philadelphia — With the likelihood that housing priorities on pig iron will be extended through the second quarter, the many consumers in this district who do not qualify for such preference are decidedly gloomy. Most are having difficulty operating on even a partial basis, and prospects of at least four months more of the same conditions are proving highly depressing. Some still entertain the hope that restrictions will at least be modified, and appeals for relief to Congress continue to mount.

Adding to present complications in this district is the enforced suspension of operations at one large stack at Bethlehem, Pa., which had been built by the government during the war. This furnace, which will probably be down for six to eight weeks for repairs, had been engaged in the production of basic. Now, another furnace will be placed on basic, but at the expense of foundry production, a shift that will be felt by various consumers in the district.

Incidentally, some district basic pig iron consumers have been able recently to build up their open-hearth operations to the highest level in weeks, but principally by virtue of a heavier receipt of scrap, with a result that actual increase in steel production is not comparable to the gain in the number of hours of open-hearth operations as the abnormal sizes of the scrap charge retards the melt.

While some foreign iron has been received at Boston, including notably 200 tons of British iron of a foundry specification and some scattered lots from England, no arrivals have been noted here nor, as far as can be learned, have there been any offerings. However, such offerings may come. With reports of more than $70 a ton being asked, these prices in some quarters are apparently being paid and, considering the general stringency in iron along the entire seaboard, to say nothing of inland, foreign producers may be encouraged to export more to this country and to diversify port destinations.

Boston — Improvement in pig iron supply has not reached the point with few larger melters to balance requirements as evidenced by the purchase of several thousand tons of foreign iron at close to $75 a ton, Boston. On the other hand, New England consumers are getting iron cheaper by $7 to $8 a ton from Everett than consumers in other sections. Supply of this lower priced iron is still by necessity spread rather thin and to meet specifications the district furnace is forced to change to malleable briefly at least each month. The relatively few basic melters are still critically short and are operating on a day-to-day basis.

Buffalo—Zero temperatures and drifting snow took a substantial bite out of this week's iron output and further aggravated tight delivery schedules. Both nearby and eastern seaboard consumers suffered as rail shipments were disrupted when yard switches were frozen or buried by snow and ice. About half of the area's sixteen furnaces were banked at one time because of the weather. Producers, however, rushed units back into action as the storm abated. By midweek 15 out of 16 area stacks had returned to action.

Pittsburgh—Foundry operations were hard hit by the shutting off of the flow of nearly all the gas to industrial plants. This in turn temporarily eased the critical pig iron shortage. Pressure for greater pig iron shipments is accentuated by the price relationship between pig iron and cast scrap. With cupola cast scrap selling at around $43 a ton delivered Pittsburgh, compared with $30.50 fob Pittsburgh

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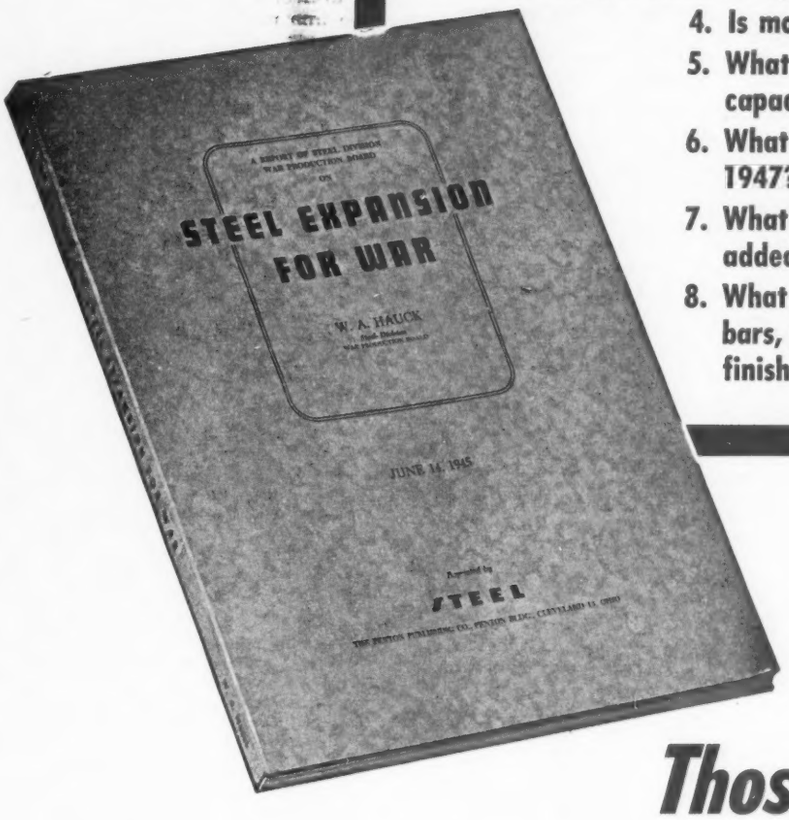

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district furnace for No. 2 foundry iron, it is logical that foundries would attempt to use a greater proportion of iron in their operation. Until wage negotiations are completed, the merchant blast furnace interest here is not expected to advance prices, despite price increase in blast furnace scrap and iron ore. Blast furnace operations are at practical capacity, with 50 out of 54 units active.

Chicago — Pig iron prices stand unchanged in this district, no producer having followed the lead of an eastern interest in an advance of $3 per ton. Demand for foundry iron is tremendous and distributors are under severe pressure for deliveries which are running about two weeks behind schedule. Foundriees are operating on hand-to-mouth basis and melts are geared to receipts. Only slim progress is being made in catching up on deferred tonnage. There is some speculation that allocations of iron will be continued beyond Feb. 28, at which date they were to be dropped.

Cincinnati — Shipments of northern and southern pig iron are lagging. Allowing for the shorter month, allocations were about equal with those of January, but the iron is not being delivered in that volume. The situation affects non-priority foundries, who are operating far below capacity, but also those with priority rating.

St. Louis—Pig iron production has remained at capacity several months with furnaces about evenly divided between foundry iron and basic. Supplies are extremely short with little prospect for improvement. Abandonment of CPA's allocation system Feb. 28 is expected to improve local supplies some, but at the expense of melters elsewhere. Producers say they will decline future order backlogs unless the prospects of filling them improve. Approximately half the basic output here is consumed locally in hot form. Ore stocks are ample until the river navigation season opens and coke is in fair supply. Some fuel was accumulated during a recent shutdown of one furnace for relining and this is expected to last until March 15. Iron shipments here from the Chicago and Birmingham districts are limited and some purchasers expect to feel a further squeeze under the free iron market.

Tubular Goods . . .

Tubular Goods Prices, Page 137

Pittsburgh — Babcock & Wilcox Tube Co., Beaver Falls, Pa., increased prices on seamless chrome-moly alloy steel tubing on price schedule B-2 covering "Croloy" grades, effective on shipments made on or after Feb. 15. The increase reflects recent increase in steel prices. Order backlogs on standard pipe are extended into 1948; hot and cold-drawn tubing 6 to 8 months in smaller size ranges. Jobbers' pipe inventories continue well below normal in relationship to extremely heavy needs.

Boston — Most pipe distributors are getting monthly quotas, although they are late as pipe mills have not made up all ground lost through last year's stoppages. Direct shipment tonnage this year is small, some producers having no openings. This leaves several utilities with uncertain prospects for extensions, including requirements for the John Hancock homes project, Brookline, Mass. Delivery on this pipe, which includes 6000 feet of 16-in. and other smaller sizes was wanted Apr. 1. One mill is reported to be booking orders tentatively for next year. Heavy buying of electric welded tubing by industrial consumers has filled books on that grade for months ahead. Boiler tubes continue on allocation and distributors are operating with a one-month inventory in many instances where they normally have two or three months stock. There is no easing in pressure tubing generally. Springfield arsenal is asking for 250 tons, 1 and 1¼-in. butt weld steel pipe with plain ends.

St. Louis—Pipe production is under increasing pressure here. Housing demands for small sizes are rising; sizes on which tonnage necessarily is more limited. Orders are backlogged seven months and producers believe two years' capacity operations will be required to meet demand at present rate. Pig iron has been critically scarce but pipe makers anticipate the junking of allocation this month will give them better supplies and also ease the heavy drain on scrap reserves. Pipe prices are unchanged but there is some possibility scrap costs may force them up. Export demand is sharply up, particularly from South America. Buyers from there are numerous in this market but their mission generally has been unsuccessful. St. Louis exports do not exceed 8 to 10 per cent of production and show no signs of going higher. Pipe demand for domestic industrial construction is increasing but production is held down by the priority given small sizes.

Seattle — Cast iron pipe continues in strong demand but agencies are handi-

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capped by slow deliveries and low allocations by mills. In some instances other types of pipe have been purchased where cast iron would have been selected had it been available in the near future.

H. C. Purcell, this city, will furnish 175 tons of 20-inch cast iron pipe for a Seattle sewer outlet project. Bids were opened in Lewiston, Idaho, Feb. 10, for 14,000 feet of 8 and 6-inch cast iron pipe. Kent, Wash., has called for bids Mar. 3 for 200 tons of 8 to 4-inch class 150, pipe, and Fir Crest, Wash. Feb. 18 for 75 tons class 150. Wenatchee, Wash., has awarded about 250 tons of steel water pipe and Hazel Dell district, Vancouver, Wash., will open bids Mar. 6 for 116,000 feet of 12 to 14-inch steel water pipe and fittings.

Scrap . . .

Heavy melting grades rise to $35 a ton, Pittsburgh . . . Movement improves

Scrap Prices, Page 142

Pittsburgh — Scrap tonnage moving into this district, either through normal channels or directly from fabricators for reciprocity reasons, has recorded substantial improvement recently. Ingot operations have held at above practical capacity by leading producer for some weeks and there is no indication of a reversal of this pace.

It is impossible to determine volume of scrap moving on basis of tie-in sales, but it must be increasing for frequent complaints are made by brokers who claim they are by-passed by this procedure. However, mills state over 90 per cent of this type tonnage is allocated through normal distribution channels.

Mills are now paying $35 per ton for steelmaking scrap originating in this district, including broker's commission. This represents an advance of $2.50 over the $32.50 price at which producers had hoped to stabilize quotations. However, since mills here must purchase remote scrap (much of which originates from customers) to meet between 20 and 30 per cent of their requirements, considerable tonnage is shipped here based on market price or less at remote points commensurate with relationships between consumer and suppliers. Thus, the increase in scrap prices from remote areas, with the price ranging up to nearly $40 in some instances, is the result of higher prices that must be paid for material at those points plus necessary freight to destination.

Railroad heavy melting steel recently was awarded at $35 a ton, establishing this grade on same basis as steelmaking scrap. However, railroad specialties are said to be going at a considerably higher level. Further upturn in prices for turnings has developed; also on cast grades.

Present level for open hearth scrap is $15 above OPA ceiling of $20, or an advance of 75 per cent since mid-November. The disparity between scrap and pig iron prices has resulted in basic steel producers increasing the hot-metal charge to extreme limits, forcing a drain on limited merchant iron available. There is some indication producers are planning to expand bessemer converter operations to offset scrap shortage and present high prices. Critical pig iron supply situation has been further accentuated by effort of many foundries to offset exorbitant cast scrap prices through increasing proportion of pig iron in their operations.

Philadelphia—Prices on principal steelmaking grades of scrap are unchanged in this district for the second week at $33.50 to $34, delivered. This material has been coming out in somewhat better volume, although not in sufficient supply to permit stocking, and as long as winter weather prevails and the stringency exists in pig iron, there is likely to be little for stock accumulation. However, once the weather does become mild for any sustained length of time, steel scrap, at anything like present prices, should move much more freely.

The volume of industrial scrap still is disappointing, due primarily to inability of manufacturers to get the quantity of finished steel they require. One large district manufacturer, for instance, whose steel requirements fall largely in sheets, has been striving for a schedule, which scrap dealers declare would net 400 tons of scrap a month, but so far has been unable to furnish scrap at a rate of more than 100 tons a month. However, scrap collections, in the event of sustained fair weather, would jump appreciably, it is believed, and if present high steel producing rates are sustained, and the outlook is encouraging, the volume of manufactured scrap should improve as time goes on.

Delivered prices of borings and turn-

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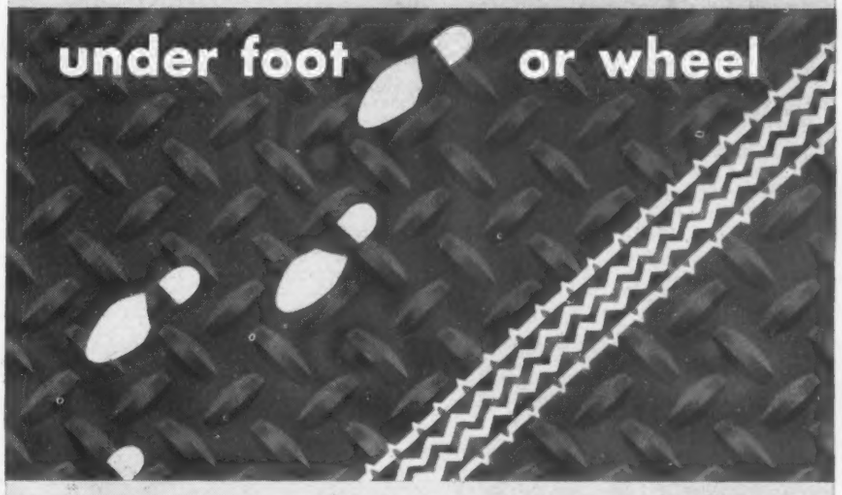

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ings again have advanced, with machine shop turnings, mixed borings and turnings and cast iron borings having moved up to a spread of $25.50 to $26, and short shoveling turnings to $27 to $27.50. Heavy turnings are now holding at $34 to $35, delivered, and bar crops and plate, punchings and plate scrap, and cut structurals at $36 to $36.50. No. 1 cupola cast is unchanged, but charging box cast has moved up to $44 to $44.50. Malleable is now $46 to $47, delivered, and No. 1 wheels, $45 to $46.

Boston—Stabilization of prices for both steel and foundry grades is in the future. Heavy melting steel at $30, shipping point, and No. 1 cupola cast at $45 are not without higher fluctuations. Increased costs in steelmaking and castings attributable to high scrap prices is causing concern. In this scrap picture, the pig iron background is important. Until more free iron is forthcoming from steel works to relieve the load on merchant furnaces, the normal influence of pig iron on scrap prices, now far out of balance, will be a factor. Supply of most scrap grades is limited and the ratio of supply being drawn off to other areas at prices which might be resisted by district consumers sets the price level.

New York—Brokers' buying prices are unchanged throughout the list of scrap, although prices on some items, such as unstripped motor blocks and malleable, are largely nominal, as stocks at present have been well cleaned up. Melting steel is moving freely, especially as a result of recent milder weather. Both the eastern Pennsylvania and Pittsburgh districts are drawing heavily on scrap here. Some important railroad equipment scrapping programs are said to be in early prospect.

Buffalo — With snow squalls and a cold wave hampering scrap collections, dealers report difficulty covering outstanding orders. Dealers found orders exceeding available supplies. Prices continued to show strength as Pittsburgh buyers were reported in the Rochester area doing business at $30.50 a ton for No. 2 heavy melting, which is equivalent to $35, Pittsburgh, and $33.50, Buffalo. This compares with a prevailing Buffalo range of $30-32. While No. 1 railroad scrap was reported changing hands at $34 a ton in cash deals, recent reciprocity transactions were reported at $32 a ton. It was generally understood that the railroads accepted the lower price to avoid paying a compensating higher price for steel products received in return for the scrap.

Chicago—Unable to withstand pressure longer, mills in this district about a week ago agreed to $2.50 more per ton for open-hearth scrap. This moved principal grades up to a top of $32.50; machine shop turnings and mixed borings and turnings to $28.00, and short shoveling turnings to $29. Although almost everyone is convinced that prices have risen to an unreasonable and shaky level, decision to pay the higher prices seemed necessary to keep other districts from taking scrap away from this area. In some quarters there is belief that the next move, and maybe not too far away, will be a recession in prices. Scrap is flowing in somewhat better volume than it has for some time, although not altogther because of the higher price level. With mills maintaining a near capacity pace, consumers are producing more scrap and moving it back.

Detroit—Scrap market here finally has reflected the pressure of steel mills scrambling to get tonnage from remote areas at practically any price. Dealers and brokers here are completely confused because of the disruption of normal processes of trade, and suggest an increase of $1.50 per ton in steel grades being as nearly representative as is possible to determine. Cast iron grades are advanced $2 a ton to $37-$39 for No. 1 cupola cast, although admittedly this is a nominal price, some tonnages going as high as $46 a ton delivered. Local mills have been paying $1 a ton premium over the local price for material from outstate.

Cleveland — Steel mills and foundries resisted the uptrend in scrap prices last week, although the former continued to buy remote material on which freight charges were high. Heavy melting grades held at $32.50 while No. 1 cupola cast held at $43 to $45. Higher prices were paid, however, for machine shop turnings at $26, short shovel turnings and cast iron borings at $26.50, electric furnace bundles at $33.50, alloy free turnings at $28.50, cut structurals at $35 and No. 1 chemical borings at $29.50.

Receipts have been adversely affected by the recent cold wave and have tended to decline on the rising market. Many holders are awaiting a possible further advance in prices. The uptrend in prices in part is attributed to reported deals involving exchange of scrap for finished steel. In some instances, steel buyers are bidding high prices for scrap in order to obtain sufficient tonnage on the open market to give them an advantage in placing orders for new steel with mills. Some mills have only a week's supply of scrap on hand in this district.

Youngstown—On the basis of the Erie scrap sale, most of which came to this district, No. 1 railroad heavy melting steel has advanced to $35, delivered consumer's plant. Other grades are higher at $50 for malleable, $35.25 for rerolling rails, $42.60 for railroad specialties, and $41 for angles and splice bars.

Cincinnati—The iron and steel scrap market is higher, and confused. Raids for material, and swapping practices have helped to shove the market from an even keel. The whole situation was attributed to the basic fact that the tonnage of scrap is inadequate to meet the demand. This theory contradicts some contentions, prevalent earlier in the year, that higher prices would bring out the scrap. Recent, heavy demands for their local scrap in the south have cut tonnage previously available in this district. Most district foundries are fairly well supplied.

Birmingham — Scrap prices continue their upward trend and considerable competitive bidding is evident, although scrap still has failed to materialize in noteworthy amounts. Republic Steel Corp. reported this week it is paying $29 to $29.50 at Gadsden for No. 1 and No. 2 heavy melting, No. 2 bundles and No. 1 busheling, in contrast to broker quotations of $27.50 to $28.00.

St. Louis—Higher scrap prices established three weeks ago so far have failed to improve shipments to this district. Labor troubles at collection points and bad

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weather are believed preventing the increase brokers had expected. Some steel mills currently are blaming tie-in transactions by fabricators for the artificial price structure. Without them, they say, the price of scrap iron and steel would drop $10 a ton. Mill stocks are around two weeks and diminishing constantly. Foundries have 30 to 45 days stocks. End of the pig iron allocation system may ease scrap melting.

Seattle — While scrap is not arriving in quantity equal to demand of mills, shipments have improved slightly and with better weather larger receipts from the country are expected. Thus far local mills have been able to maintain operations. Output of ship-breaking yards is increasing but available tonnage is not on the market. The Maritime Commission has been asked to offer vessels from the local lay-up fleets in order to speed up the ship breaking program. Cast iron scrap is also decidedly scarce. Lack of pig iron has increased demand for scrap. Foundries are in a precarious position and unless relief is speedily granted, operations will be curtailed.

Ferroalloys . . .

Ferroalloy Prices, Page 139

New York — Increases in the prices of ferrotungsten and tungsten powder were announced Feb. 10 by Electro Metallurgical Sales Corp. The new prices become effective Mar. 1 on contracts and become immediately effective on spot transactions. The increase in ferrotungsten amounts to 10 cents a pound of contained tungsten, making the new eastern zone contract price $1.98 in lots of 10,000 pounds of contained tungsten. Tungsten powder prices are increased 15 cents a pound, making the price for the melting grade $2.65 in the eastern zone in lots of 1000 pounds or more. Quantity, zone, and spot differentials remain unchanged.

Warehouse . . .

Warehouse Prices, Page 139

Pittsburgh — Distributors report no improvement in mill shipments recently, with result stocks continue to shrink. In some instances inventories are lowest on record, particularly in flat rolled products. Details of warehouse steel extras soon should be available with release of new price books; and are expected to vary considerably with general pattern established by the mills. To avoid the mill extra of 15 cents on bars when ordering to dead lengths, distributors are accepting random lengths which in some instances are said to far exceed the 10 per cent as specified in mill extra cards. At the moment distributors do not know whether they will be able to save money by ordering to random lengths, because of the possibility of holding the "bag" with a lot of odd sizes, but are going to try it out for 30 days or more. Warehouses have established the policy of selling flat-rolled sheet 3/16-in. thick 48 inches wide and under as a sheet item; over 48 inches as a plate.

Boston—Warehouses, dealers and distributors are getting roughly around 18 per cent of total steel production, but this is not sufficient to meet heavy demand. With the exception of structurals in some instances, distributors

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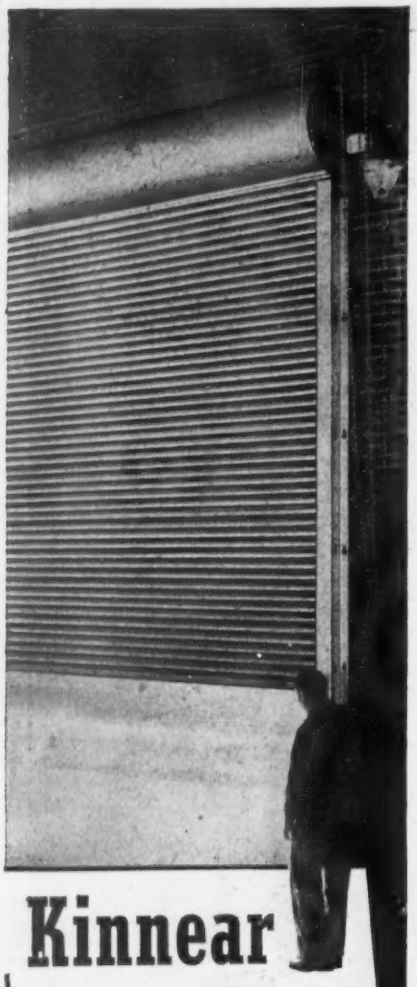

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note but slight increase in mill receipts. Giving the most concern is the outlook for second quarter tonnage. While some have been able to place limited firm tonnage for second quarter, jobbers are still uncertain as to tonnage and kinds of steel they will be able to sell in that period. Flat-rolled and light plates, small bars and strip are notably short.

Chicago—Warehouses continue pressed to accommodate requirements of customers, with the result that manufacturing operations are becoming more spotty because of material shortage. More and more plants are forced to reduce working hours or shut down periodically. Material is flowing from mills to warehouses in reasonably good volume, but is far below volume to keep warehouses stocked. Flat rolled products and small size carbon bars are particularly scarce.

Detroit — It continues impossible to develop firm warehouse prices in this district as in others, principally because of difficulties over figuring mill quality extras. However, demand for steel continues strong, particularly for plates, sheet and strip. Warehouse stocks are as satisfactory as might be expected under a system of mill allocations and in the face of urgent requirements from buyers.

Cincinnati — The warehouse supply situation is deteriorating, because of shrinkage tonnage from mills. Some jobbers say the gap between supply and demand is wider than during the war. Plates have moved into the scarce list, which includes, sheets, structurals, and small bars.

Pacific, Gulf Port Bases No Longer Apply on Steel

(*Continued from Page* 61)

ard and cement coated and galvanized nails at $4.83; barbed wire 114 per base column, woven fence 107 and bale ties 110; and wire rods 3.27 per 100 pounds.

Geneva Steel Co. announced a delivered price base on structural shapes of $2.675 per 100 lbs fob Geneva, Utah, and $2.825 on plates, including a 2.5 cents switching charge. The delivered price at West Coast ports of San Francisco and Los Angeles is $3.37 on shapes and $3.52 on plates, using the present 70-cent freight rate plus the 3 per cent federal transportation tax. On basis of the 46-cent truck rate plus a loading charge at Geneva of 5 cents and the transportation tax, structurals would be $3.17 and plates $3.32 delivered San Francisco and Los Angeles. Using the rail freight rate of 48 cents, which has been published to become effective Mar. 1, 1947, plus the transportation tax, the delivered price will be $3.14 on shapes and $3.29 on plates. These same prices apply to Portland, Oreg., and Vancouver, Wash., except that there is no truck rate or truck delivered price. To Tacoma and Seattle, the delivered price would be $3.43 for structurals and $3.58 on plates, using present rail rate of 76 cents plus transportation tax. On basis of the 54-cent rail freight rate soon expected to become effective, the price will be $3.21 on shapes and $3.36 on plates delivered Tacoma and Seattle. For the range of sizes and types of structural shapes not produced at Geneva, the eastern governing basing point would be Sparrows Point, Md., on plates and Bethlehem, Pa., for structurals.

Kaiser Co. Inc. has announced the following prices, f. o. b. Los Angeles and San Francisco, including switching: Structurals at $3.41 for all angles, standard beams and channels, with a few H-beams; plates at $3.46 from 3/16-in. to 2 inches thick and from 48 to 96 inches wide; merchant carbon bars at $3.56 from 3/4-in. to 6 inches for rounds and squares and full range in flats. The company is selling a very limited tonnage of alloy spring steel flats at $3.9165, f. o. b. Los Angeles.

In determining the delivered price at key Pacific ports for steel products outside the range of types and sizes of products for which basing points have not been established at West Coast points, Columbia Steel Co. is reported to have adopted the following procedure in arriving at delivered prices:

To the price base at the governing eastern basing point is added the sum of the freight to seaboard; ocean freight of 62.5 cents for plates, shapes, bars and sheets, marine insurance said to average 1.5 cents, and wharfage and loading and switching charges, which vary between ports. Ocean freight on bale ties is 82.5 cents; fencing, 80 cents; pipe, 65 cents; wire, 63 cents.

To cover the wharfage and loading charges at ports in Oregon and Washington, a charge is made of 2.5 cents per 100 lbs in open cars only; at all California ports (except Sacramento, which is 7 cents) it is 4.5 cents.

To cover the switching costs at West Coast ports, Columbia Steel is understood to add for each 100 pounds 4.5 cents at San Francisco; 4 cents at Los Angeles, Tacoma, Portland and Seattle; 3 cents at Everett and Bellingham; 2.5 cents at Richmond, Long Beach, San Pedro, Oakland, Stockton and Wilmington; and 1 cent at Sacramento. The switching charge at Los Angeles and vessel shipments from the East is 5.5 cents for each 100 lbs. Los Angeles is not considered a port and shipments inland must be made by rail through Wilmington. On shipments from the East, the customer will be charged additional freight if the steamship line does not protect the terminal rate when the vessel is unable to dock at its point of destination and is forced to go to another port.

The eastern governing basing point on shipments to the West Coast on hot-rolled sheets under 60 in. wide in Sparrows Point, Md.; over 60 in., Pittsburgh, according to current price an-

nouncements. On cold-rolled, electrical and enameling sheets, Pittsburgh price base governs; Sparrows Point on galvanized; Pittsburgh on culvert sheets and galvannealed. Birmingham is the governing basing point on hot-rolled strip; Pittsburgh on cold-rolled. Pittsburgh governs on shipments of pipe. All price bases mentioned above are subject to range of sizes and types produced at those points.

Chicago is governing basing point on cold-finished carbon bars and tin plate to which all rail freight rates of $1.20 and 87 cents, respectively, per 100 lbs in carlots, plus 3 per cent transportation tax, must be added for all West Coast points. The all rail rate from Pittsburgh to West Coast, exclusive of tax, is $1.37 on bars and 87 cents on tin plate.

Rail freight rates on carlots to seaboard, excluding transportation tax, from key basing points are as follows: Pittsburgh, 36 cents per 100 pounds; Bethlehem, Pa., 14 cents; and Birmingham, 23 cents. It is understood that Bethlehem Steel Corp. considers the cost of transportation from Sparrows Point to dock is 4 cents.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2100 tons, power plant, Central New York Power Co., Oswego, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Stone & Webster Engineering Corp., Boston, contractor-engineer.

2050 tons, power plant addition, Buffalo Niagara Electric Co., Buffalo, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Stone & Webster Engineering Corp., Boston, engineer-contractor.

900 tons, extension to power plant, Tecumseh, Kans., for Kansas Power & Light Co., to Bethlehem Steel Co., Bethlehem, Pa.

600 tons, sheet piling, contract D-8, Dearborn St. subway, Chicago, for city, to Carnegie-Illinois Steel Corp., Chicago; Peter Kiewit Sons Co., Chicago, and S. A. Healy Co., Chicago, joint contractors; bids Aug. 29.

420 tons, diesel shop, Barstow, Calif., for Atchison, Topeka & Santa Fe Railroad, to Consolidated Steel Corp., Los Angeles.

400 tons, contract D-8, Dearborn St. subway, Chicago, for city, to American Bridge Co., Pittsburgh; Peter Kiewit Sons Co., Chicago, and S. A. Healy Co., Chicago, joint contractors; bids Aug. 29.

250 tons, addition to paper mill, Camas, Wash., to Pacific Car & Foundry Co., Seattle.

225 tons, commissary, Chicago, for Atchison, Topeka & Santa Fe Railroad, to Duffin Iron Co., Chicago; Ellington Miller Co., Chicago, contractor; bids Jan. 27.

225 tons, factory building, Parsons Paper Co., Holyoke, Mass., through Westcott & Mapes, New Haven, to Lehigh Structural Steel Co., Allentown, Pa.

200 tons, conveyor trestles, Lehigh Navigation Coal Co., Tamaqua, Pa., to Bethlehem Contracting Co., Bethlehem, Pa.

154 tons, bridge, Avoca, Iowa, for Chicago, Rock Island & Pacific Railroad, to American Bridge Co., Pittsburgh; bids Jan. 27.

140 tons, reconstruction of Little Calumet river bridge, Harvey, Ill., for Illinois Central Railroad, to American Bridge Co., Pittsburgh.

100 tons, addition to cement plant, Bellingham, Wash., to Pacific Car & Foundry Co., Seattle.

100 tons, building, Hanson Textile Co., Hatfield, Pa., to Frank M. Weaver Co., Philadelphia.

STRUCTURAL STEEL PENDING

13,000 tons, veterans hospitals at Buffalo and Albany, joint bids asked up to 10 a.m. Feb. 17, U. S. Engineers office, Buffalo.

4000 tons, women's dormitory, Penn State College, State College, Pa.; readvertised, bids due Feb. 24.

1400 tons, Sam Minskoff apartment, 69th St. and Park Ave., bids asked.

1000 tons, Public School No. 26, Queens, bids Feb. 18.

450 tons, plant extension, Brooklyn Union Gas Co., Brooklyn, N. Y., with bids being taken by United Engineers & Constructors, Philadelphia.

400 tons, manufacturing building, Chicago, for Goodman Mfg. Co.; bids Feb. 19.

375 tons, addition to foundry, Chicago Heights, Ill., for American Manganese Steel Division, American Brake Shoe Co.; Ragnar Benson Inc., Chicago, contractor.

164 tons, state bridge, Bedford county, Pennsylvania, bids Mar. 14.

150 tons, building, Denny Tag Co., Westchester, Pa.

137 tons, state bridge, Franklin county, Pennsylvania, bids Mar. 7.

100 tons, platform, Illinois-Owens Glass Co., Fairmont, W. Va.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2600 tons, contract D-8, Dearborn St. subway, Chicago, for city, to Carnegie-Illinois Steel Corp., Chicago; Peter Kiewit Sons Co., Chicago, and S. A. Healy Co., Chicago, joint contractors; bids Aug. 28.

2000 tons, unstated project in Columbia basin, Washington, to Bethlehem Pacific Steel Co., Seattle.

1200 tons, tanks and structures at Hanford, Wash., to Bethlehem Pacific Steel Co., Seattle; Morrison-Knudsen Co., general contractor.

500 tons, miscellaneous small tonnages, to Bethlehem Pacific Steel Co., Seattle.

120 tons, electrical engineering building, Urbana, Ill., for University of Illinois, to Bethlehem Steel Co., Bethlehem, Pa.; John Felmley Co., Bloomington, Ill., contractor; bids Jan. 21.

105 tons, commissary building, Chicago, for Atchison, Topeka & Santa Fe Railroad, to Joseph T. Ryerson & Son Inc., Chicago; Ellington Miller Co., Chicago, contractor; bids Jan. 27.

100 tons, water reservoirs Home Water district, Portland, Oreg.; E. E. Settergren, Portland, Oreg., general contractor.

100 tons, various highway projects, Washington state; general contracts placed.

REINFORCING BARS PENDING

1000 tons, three buildings, Washington State college, Pullman, Wash.; Nettleton & Baldwin, Seattle, and Henry George & Sons, Spokane, Wash., low, $3,772,785; only $3 million available; additional funds asked of state legislature.

900 tons, University of Washington buildings, Seattle; bids Mar. 4.

204 tons, mechanical engineering building, Urbana, Ill., for University of Illinois; bids of Feb. 3 rejected, new bids Feb. 27.

100 tons, Yankee Spredwell Co. processing plant, Seattle; Atherton Construction Co., Seattle, general contractor.

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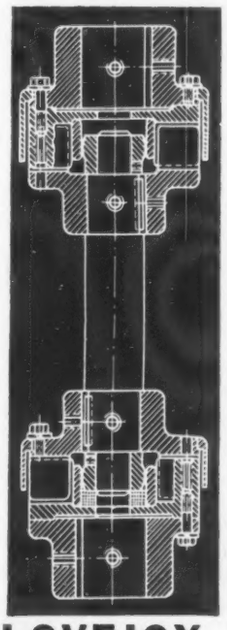

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PLATES . . .

PLATES PLACED

5600 tons, including 2600 bench mined liner plates and 3000 shield mined liner plates, contract D-8, Dearborn St. subway, Chicago, for city, to Commercial Shearing & Stamping Co., Youngstown, O.; Peter Kiewit Sons Co., Chicago, and S. A. Healy Co., Chicago, joint contractors; bids Aug. 29.

PLATES PENDING

185 tons, U. S. Engineer, Memphis, Tenn.; also 34 tons, hot-rolled annealed sheets; inv. 80.

RAILS, CARS . . .

RAILROAD CARS PLACED

Wheeling & Lake Erie, 1250 hopper cars, 1000 of 70 tons capacity going to the Greenville Steel Car Co., Greenville, Pa., and 250 of 50 tons capacity to the American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Central of Brazil, 35 passenger cars, bids asked.

LOCOMOTIVES PLACED

Russia, 5 steam locomotives, to Davenport, Besler Corp., Davenport, Ia.; these are in addition to 30 placed early last year.

PIPE . . .

CAST IRON PIPE PLACED

175 tons, 20-in. sewer outlet, Seattle, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.; Henry Finch, low, $97,946 for general contract.

CAST IRON PIPE PENDING

200 tons, 8 to 4-in. class 150; bids to Kent, Wash., Mar. 3.

Unstated, 14,000 feet, 8 and 6-in.; bids to Lewiston, Idaho, Feb. 10.

STEEL PIPE PLACED

250 tons, water pipe, Wenatchee, Wash., awarded to unstated interest.

STEEL PIPE PENDING

Unstated, water pipe and fittings for Hazel Dell water district, Vancouver, Wash., 116,000 feet 12 to 4-in.; bids Mar. 6; Henry L. Gray, Seattle, engineer.

CONSTRUCTION AND ENTERPRISE

ALABAMA

ENSLEY, ALA.—Precision Crown Co. has let contract to Day & Richardson, Birmingham, for construction of coat hanger manufacturing plant costing approximately $55,000.

ARKANSAS

NORTH LITTLE ROCK, ARK.—Leylind Mfg. Co., W. P. Finley, president, 622 E. Markham St., Little Rock, has named Yandell Johnson, 113 E. 9th St., Little Rock, as architect for two buildings containing 43,000 sq ft of floor space. Installation of new equipment in the furniture plant will bring cost to $350,000.

CALIFORNIA

PASADENA, CALIF.—California Institute of Technology plans construction of $3 million supersonic wind tunnel for Army Ordnance Department in connection with its jet propulsion laboratory.

SAN FRANCISCO—Nate J. Fulop Co. has been incorporated with 2500 shares of no par value capital stock. The company will manufacture and deal in apparatus, tools, machinery and accessories.

SANTA CLARA, CALIF. — Pittsburgh-Des Moines Steel Co. will build a steel fabricating plant to cost $167,000.

CONNECTICUT

EAST HARTFORD, CONN.—Pratt & Whitney Division, United Aircraft Corp., 400 Main St., has awarded a contract for a 1-story, 80 x 95 ft dynamometer plant to Turner Construction Co., 38 Newbury St., Boston. Engineer for the project, to cost $130,000, is Albert Kahn Associated Architects & Engineers Inc., 345 New Center Bldg., Detroit.

FLORIDA

CANTONMENT, FLA.—St. Regis Paper Co. has contracted with Chapman & Scott, New York, for the construction of a paper mill costing $923,500.

JACKSONVILLE, FLA.—General Chemical Co., 40 Rector St., New York, will construct for $260,000 a sulphate plant.

MOORE HAVEN, FLA.—Glades Electric Cooperative has awarded a contract to Murphy Construction Co., West Palm Beach, Fla., for a power plant to cost $106,343. Engineer is James, Allen, Tuck Corp., New York.

GEORGIA

ALBANY, GA.—Armena Lime Mine & Farms Inc. has awarded a $150,000 contract for a lime crushing plant to R. J. Edgerly, Albany.

MARIETTA, GA.—Holeproof Hosiery Co. has granted a contract to Sam N. Hodges, Bona Allen Bldg., Atlanta, for construction of a hosiery mill building to cost $125,000.

IDAHO

BOISE, IDA.—Idaho Power Co. plans a $10 million dam and power installation on the Snake river providing the Oregon legislature amends the present licensing act.

BOISE, IDA.—Linde Air Products Corp., 30 E. 42nd St., New York, has named F. P. Klooepfer, 416 S. Sixth St., as contractor for a 1-story, 78 x 84 ft, oxygen and acetylene plant, to cost $130,000.

BOISE, IDA.—Idaho Steel Products Co., 4311 Gage St., has awarded a contract for a 2-story 140 x 170 ft mill to Moody & Davis, Boise. Architect for the steel manufacturing plant, which will cost $90,000, is Alexander & Associates, 12 S. Fourth St.

INDIANA

TERRE HAUTE, IND.—Commercial Solvents Corp. has given a contract to Blaw-Knox Co. to erect and design a plant for the manufacture of an agricultural insecticide.

KANSAS

REECE, KAN. — Tanker Gas Inc., Sexton Bldg., Minneapolis, plans to build a $750,000 carbon black plant.

VALLEY CENTER, KAN. — Midway Pipe Line Co., c/o Black-Marshall Oil Co., Great Bend, Kan., has plans under way for five booster pump stations on proposed crude oil line between Amarillo, Tex., area and Valley Center. Cost is tentatively set at $1,750,000.

MASSACHUSETTS

LYNN, MASS.—General Electric Co. has named Turner Construction Co., 38 Newbury St., as contractor for its 1-story, jet-engine, testing facilities plant which will cost $150,000.

MICHIGAN

DEARBORN, MICH.—Univex Die Cast & Engineering Co., 7001 Chase Rd., has been organized by Sam Lund with a $200,000 capital as a general manufacturing firm.

DETROIT—Arlington Aluminum Co. 9011 W. Davison Ave., has been formed for a general manufacturing business. Grant Folin is the

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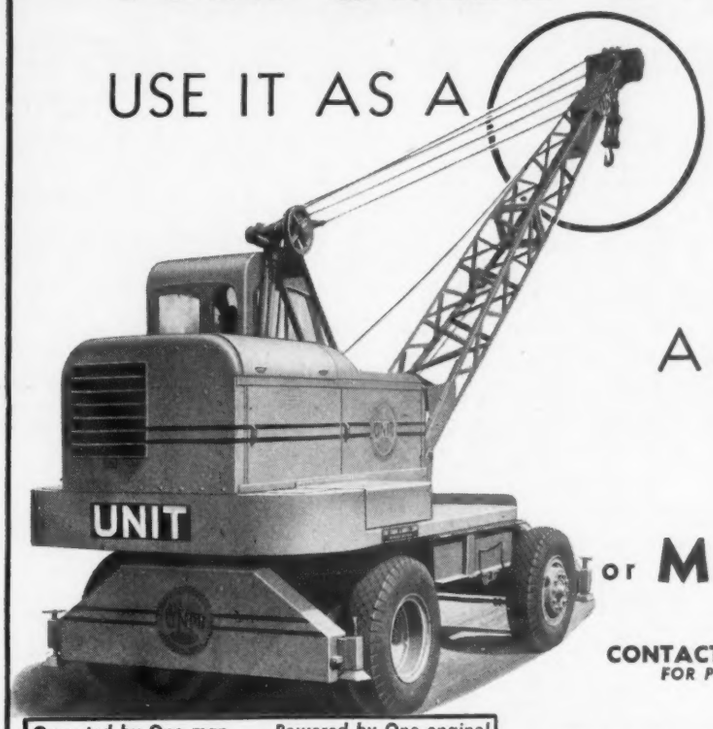

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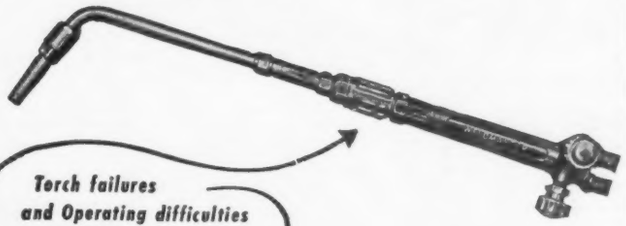

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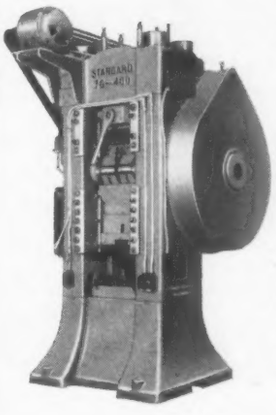

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principal of the firm which has a capital of $110,000.

DETROIT—Experimental Tool & Die Co. Inc., 12605 Greiner, has been organized as a general manufacturing firm with a capital of $50,000 by Herbert Kubison.

DETROIT—Lee Engineering Co. Inc., 21 Henry St., has been organized to manufacture tools, dies and machinery. Chite S. Lee is principal in the company which has been capitalized at $50,000.

HERSHEY, MICH.—Ottewa & Allegan Electric Co. will soon let a $125,000 contract through J. & G. Daverman Co., Keeler Bldg., Grand Rapids, Mich., for a power plant.

PLEASANT RIDGE, MICH.—United Castings Corp., 420 E. Ten-Mile Rd., has been formed by Duane Vincent with a capital of $250,000 to engage in a general manufacturing business.

MINNESOTA

BENSON, MINN.—Western Minnesota Cooperative, L. C. Sabie, secretary, has contracted with Cooper-Bessemer Corp., Mount Vernon, O., for furnishing and installing three 1000 kw diesel engines and generator. Cost will be $307,746.

HASTINGS, MINN.—Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul, has awarded a $150,000 contract to W. Murphy & Son, 428 New York Bldg., St. Paul, for a resin plant. Engineers are Toltz, King & Day, 1509 Pioneer Bldg., St. Paul.

MISSOURI

JOPLIN, MO.—Community Dairy Products Co., 2438 Broadway, Kansas City, Mo., has awarded a $250,000 contract for a dairy processing plant to G. W. Miller, 414 Grant St., Carthage, Mo.

ST. LOUIS—Missouri Pacific Railroad will spend $7,592,370 in 1947 on improvements.

ST. LOUIS—Southwestern Bell Telephone Co. has awarded a contract for a $200,000 addition to its Flanders exchange to Gamble Construction Co., 804 Pine St.

UNIVERSITY CITY, MO.—St. Louis County Water Co., Charles E. Jutz, president, 6600 Delmar Blvd., plans erection of shops and an office building at 8691 Olive St. Joseph D. Murphy 4756 McPherson Ave., St. Louis, is the architect.

MONTANA

BUTTE, MONT.—Montana Power Co., J. E. Corette, Jr., vice president, announces $6 million capital addition project for the next two years.

GLENDIVE, MONT. — Northern Pacific Railway, 175 E. 5th St., St. Paul, has plans under way for diesel shop alterations to cost $400,000. L. P. Curtiss Co. is the architect.

NEVADA

RENO, NEV.—Eagle Picher Co., 125 E. 17th St., has awarded a contract for construction of mill, laboratory and office buildings, costing $55,000, to Knapp Engineering Co., 760 Folsom St., San Francisco.

NEW JERSEY

CAMDEN, N. J.—Radio Condenser Co., Copewood and Thorn Sts., has awarded a contract for a warehouse addition to H. John Homan Co., 434 Haddon Ave. Architect for the building, which will cost $185,000, is G. Neutze, Third and Grant Sts.

PHILLIPSBURG, N. J.—Ingersoll-Rand Co. will build two plants at a cost of $567,000. Engineer is United Engineers & Constructors Inc., 1401 Arch St., Philadelphia.

NEW YORK

BUFFALO—National Aniline Division, Allied Chemical & Dye Corp., 1051 S. Park Ave., will build boiler and steam plant additions and additions to a tank car warming chamber building to cost over $175,000.

SCHENECTADY, N. Y.—General Electric Realty Corp., River Rd., plans a $469,000 addition to building #265. Contractor and engineer is United Engineers & Contractors Inc., 1401 Arch St., Philadelphia.

OHIO

AKRON—Ohio Edison Co., 47 N. Main St., will install more than $3 million worth of equipment in its new plant addition to be constructed at a cost of $780,000.

BEREA, O.—Berea Industries Inc. has been formed for the manufacture of prefabricated houses. It has taken over the former grindstone buildings of Cleveland Quarry Co. on Mill St.

CANTON, O.—Stillwater Mining Co. has been incorporated to conduct mining operations near here.

CANTON, O.—Ohio Power Co., 305 Cleveland Ave., will expand its facilities at a cost of $1,500,000. Program includes a 1-story, 60 x 100 ft substation, modernization of street lighting system, a new 132,000-volt transmission line and extension of the 70-block downtown underground conduit system.

CLEVELAND, O.—Sheffield Bronze Paint Corp., 12405 Euclid Ave., will build a $160,000 factory at 17206 Waterloo Rd.

CLEVELAND, O.—Sherwin-Williams Co. will build a 3-story warehouse at 601 Canal Rd., which includes a 60 x 60 ft street-level loading dock with conveyor facilities, and a solvent extraction plant at W. 3rd St. and Cuyahoga Ave.

CONNEAUT, O.—American Fork & Hoe Co. will enlarge its local plant here with additional facilities, including a warehouse, to cost $150,000.

COSHOCTON, O.—Central Ohio Drilling Co., 317 N. Second St., has been formed by Earl McDonald to engage in coal testing and sounding and drilling for oil, gas and water.

DAYTON, O.—Air Reduction Sales Co., Sellers Rd., has awarded a $200,000 contract for a factory to Henry Stock & Son, Custer Bldg.

MARYSVILLE, O.—Vanenco Tool & Machine Products Co., 14th & Ohio Sts., has been formed by Harry Van Raaphorst with a capital of $70,000 to engage in a general manufacturing business.

SEBRING, O.—Grindley Artware Co. suffered fire damage estimated at $175,000.

TOLEDO, O.—Champion Spark Plug Co., 900 Upton Ave., has named H. J. Spieker Co., 1418 Elm St., as contractor for a 1-story, 68 x 83 ft addition to its warehouse and a 90 x 224 ft factory, to cost $235,000.

YOUNGSTOWN—General Fireproofing Co. is taking bids for its proposed 4-story, 110 x 180 ft building.

OREGON

PORTLAND, ORE.—Portland Chain Mfg. Co., 6630 N. Burlington, is building a plant and office addition, 50 x 75 ft.

PORTLAND, ORE.—Refinery Industries Inc., 8443 N. Kerby St., suffered $100,000 damage when a 25,000-gal. steel tank was burned. M. E. Vande Water, president, announces rebuilding will begin as soon as possible.

ROSEBURG, ORE.—California-Oregon Power Co. will build a $4 million Tokotee power project on the Umpqua river, 50 miles east of here. Project involves earth-fill diversion dam, concrete spillway, 1500 ft steel pipe, steel frame power house, two vertical reaction turbines and 40 miles of transmission line.

PENNSYLVANIA

BRACKENRIDGE, PA.—Allegheny Ludlum Steel Corp. has contracted with Rust Furnace Co., Pittsburgh, for a continuous slab heating furnace to heat steel alloy billets prior to rolling. Contract price is in excess of $160,000.

FRANKLIN, PA.—Joy Mfg. Co. has awarded a $150,000 contract for a 1-story factory and a 2-story office building to H. T. Osborne & Co., 631 13th St.

NORRISTOWN, PA.—Philadelphia Electric Co., 900 Sansom St., Philadelphia, has let a contract for a steam electric generating plant to Dravo Corp., Neville Island, Pittsburgh. R. J. Milligan has been named engineer for the project which will cost $1,975,000.

PHILADELPHIA — Barrett Division, Allied Chemical & Dye Corp., Margaret and Bermuda Sts., has awarded a $98,000 contract to repair a chemical manufacturing building to Frank V. Warren Inc., Lewis Tower Bldg.

PHILADELPHIA—Edward G. Budd Mfg. Co., 2450 Huntington Park Ave., has awarded a $55,000 contract to Wark & Co., 1700 Sansom St., for a 1-story, 26 x 220 ft addition.

QUAKERTOWN, PA.—Hajoca Corp., Lansdale, has let a $60,000 contract to Quaker Construction Co., 345 Franklin St., for a 1-story, 125 x 208 ft foundry addition.

RHODE ISLAND

WARWICK, R. I.—Morgan Associates, c/o John F. Hogan, architect, 7 Dyer St., Providence, R. I., have awarded a $60,000 contract to Gilbane Building Co., 90 Calverly St., Providence, for a 1-story, 75 x 200 ft foundry plant.

TEXAS

DALLAS, TEX.—National Welding and Grinding Co., a manufacturing concern with $100,000 capital stock, has been granted a state charter.

DALLAS, TEX.—Hobbs Trailer Equipment Co. has awarded contract to Nathan Wohlfeld, Dallas, for construction of building to cost $110,000. Architect is Wyatt C. Hedrick, First National Bank Bldg., Ft. Worth, Tex.

HOUSTON, TEX.—Republic Supply Co., 502 N. Greenwood, has let a contract to W. S. Bellows Construction Co., 716 N. Everton St. for construction of 1-story warehouse to cost $195,000.

INGLESIDE, TEX.—Sun Pipe Line Co., M. Esperson Bldg., Beaumont, Tex., has awarded a $1,500,000 contract to Lee Aikin, Corpus Christi, Tex., for storage and docking facilities near here. W. C. Kinsolving, Beaumont, is the engineer.

WINNIE, TEX.—McCarthy Oil & Gas Corp., 1505 Sterling Bldg., Houston, Tex., has plans in progress by Wyatt C. Hedrick, 5201 Fannin St., Houston, for a chemical plant to cost approximately $3 million.

WASHINGTON

SEATTLE—Seidelhuber Iron & Bronze Works, 1421 Dearborn St., has contracted with Leckenby Structural Steel Co. for erection of a steel frame pressing shop on a new location on Harbor Island.

CANADA

COBOURG, ONT.—Canadian General Electric Co. Ltd., 212 King St. W., Toronto, has awarded contract to A. W. Robertson Ltd., 57 Bloor St. W., Toronto, for construction of a plant estimated to cost $75,000.

LONDON, ONT.—Canadian General Electric Co. 212 King St. W., Toronto, is having plans prepared by O. Roy Moore & Co., architect, 260 Dundas St., London, for construction of plant estimated to cost $150,000.

ARVIDA, QUE.—American-Quebec Zinc Refining Co. Ltd. is having a preliminary survey made by Fraser Brace Ltd., 360 St. James St., Montreal, in connection with construction of zinc smelter to cost about $10 million.

MONTREAL, QUE.—Standard Desk Manufacturers Ltd., 4157 St. Antoine St., has awarded general contract to Ain & Zakuta, 5402 Hutchinson St., for construction of factory at Clark and Port Royal Sts., estimated to cost about $125,000. Maxwell M. Kalman, 4914 Victoria Ave., is architect.

ST. CASIMIRE, QUE.—Fonderie Trottier is having plans prepared by Jean & Dupere, architects, 2 Abraham Hill, Quebec, Que., for construction of a foundry to cost about $75,000.

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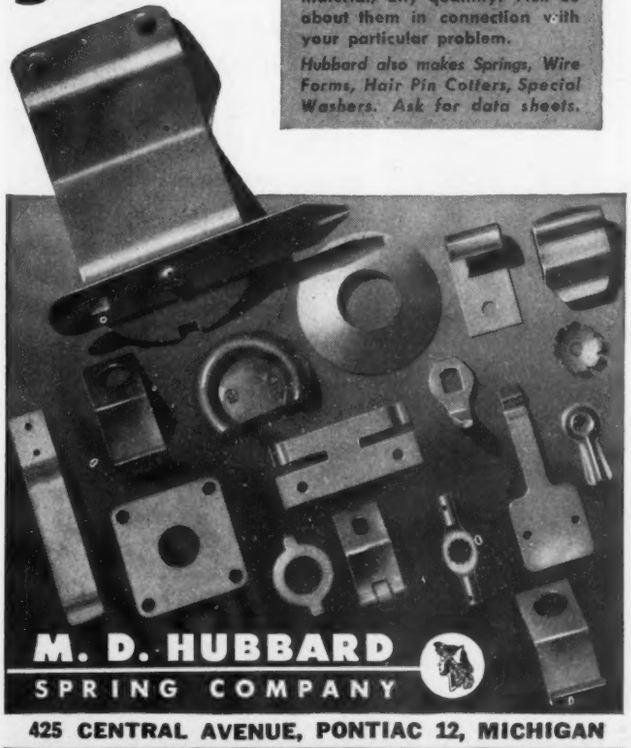

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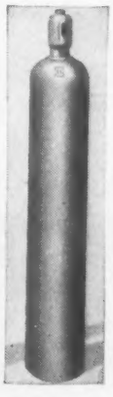

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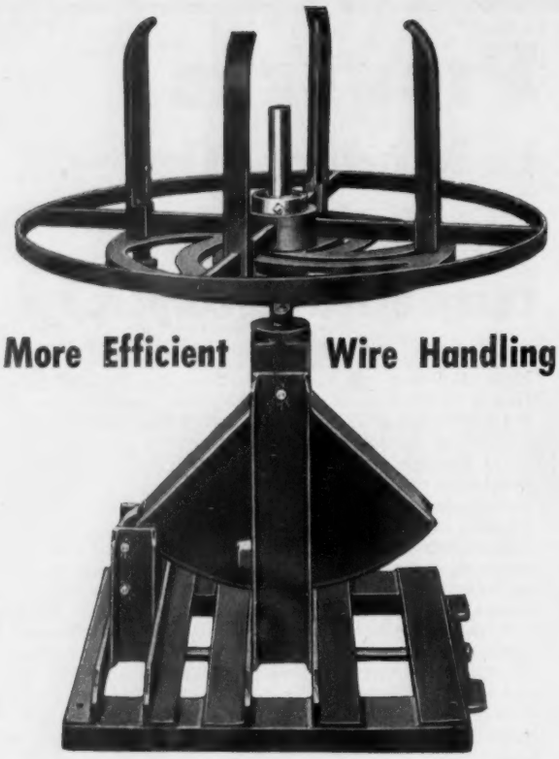

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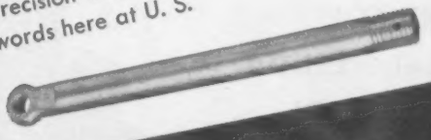

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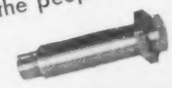

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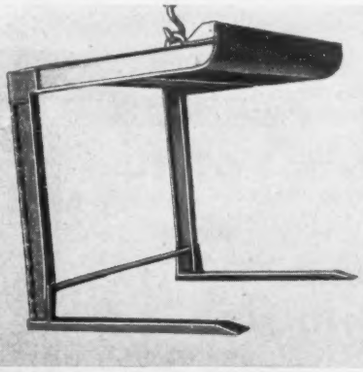

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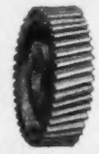

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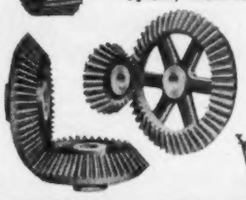

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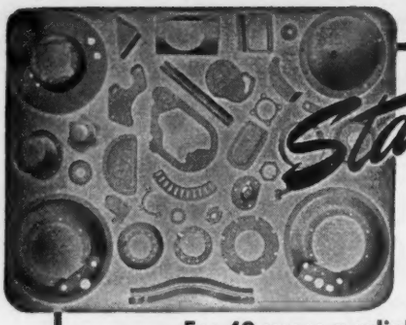

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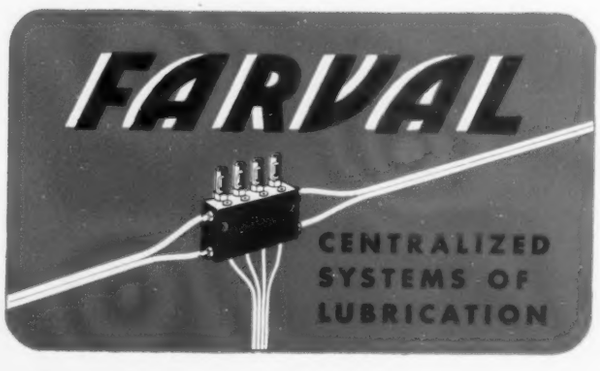
1. Number of Machines	12	5
2. Type of operation	Continuous, 24 hrs. daily*	Continuous, 24 hrs. daily
3. Lubrication Shutdowns	Every 4 hours*	None
4. Bearing history	Frequent failure* Replacements necessary*	Condition excellent No visible wear
5. Maintenance cost	100%	25%
6. Production output	88%	100%

* Continuous operation could not be maintained because of lubrication shutdowns and bearing failures.



FARVAL— *Studies in Centralized Lubrication* No. 79

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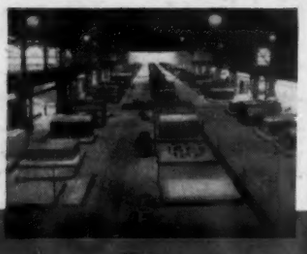
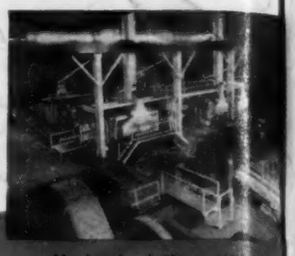
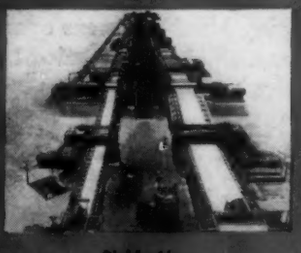


Annealing Furnaces



Mechanized Sheet Mill



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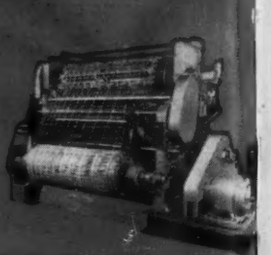
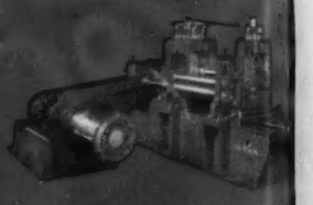


No. 1135 Farm and Field Fence Machine

8 Block Fine Wire Tinning Take-up Frame



Strip Reel and Slitting Unit

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16 Block Wire Drawing Machine

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in

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The Magazine of Metalworking and Metalproducing

PENTON BUILDING
CLEVELAND 13, OHIO

Section Two

FEBRUARY 17, 1947

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Ryerson, Jos. T., & Sons, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

BARS (Iron)

Ryerson, Jos. T., & Son, Inc., 16th & Rockwell St., Chicago 80, Ill.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.

BARS (Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
American Petrometal Corp., 1102 Broadway at 11th St., Long Island City 2, N. Y.
*American Rolling Mill Co., The Rustless Iron & Steel Div., 3400 E. Chase St., Baltimore 13, Md.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Atlantic Steel Products Co., 1330 N. 30th St., Philadelphia 21, Pa.
Avondale Marine Ways, Inc., Westwego, La.
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Columbia Steel Co., San Francisco 6, Calif.
Continental Steel Corp., Kokomo, Ind.
*Copperweld Steel Co., Warren, O.
Craine-Schrage Steel Co., 1025 S. Oakwood Ave., Detroit 25, Mich.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.
*Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
*Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
*Kloster Steel Corp., 224 N. Justine St., Chicago 7, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
*Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Pittsburgh-Crucible Div. Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept ST, Cleveland 4, O.
Stanley Works, The, New Britain & Bridgeport, Conn.
Tennessee Coal, Iron & Railroad, Brown-Marx Bldg., Birmingham 2, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
*United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

BASES (Welded Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.
Farrel-Birmingham Co., Inc. Ansonia, Conn.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Warren City Mfg. Co., Warren, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

BASES, MOTOR (Adjustable)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Lovejoy Flexible Coupling Co., 5071 W. Lake St., Chicago 44, Ill.

BASKETS (Perforated Metal)

Diamond Mfg. Co., Wyoming, Pa.
Stanwood Corp., 4825 W. Cortland St., Chicago 39, Ill.

BASKETS (Wire and Metal)

Bethlehem Steel Co., Bethlehem, Pa.
Rolock, Inc., 1380 Kings Highway, Fairfield, Conn.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.
Stanwood Corp., 4825 W. Cortland St., Chicago 39, Ill.
Steel Parts Mfg. Corp., Div. of Blackstone Mfg. Co., 226 S. Morgan St., Chicago 7, Ill.

BATHS (Heat Treating, Cyanide, Salt, Silicon)

duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.

BATTERIES (INDUSTRIAL TRUCK)

Philco Corp., Storage Battery Div., 467 Calhoun St., Trenton 7, N. J.

BATTERIES (Storage)

Edison Storage Battery Div. of Edison, Thomas A., Inc., West Orange, N. J.
Electric Storage Battery Co., The, 19th St. & Allegheny Ave., Philadelphia 32, Pa.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Philco Corp., Storage Battery Div., 467 Calhoun St., Trenton 7, N. J.

BATTERY CHARGING APPARATUS

Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1310 St. Paul Ave., Milwaukee 1, Wis.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

BEAMS, CHANNELS, ANGLES, ETC. (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

BEAMS, CHANNELS, ANGLES, ETC. (Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa
Atlantic Steel Products Co., 1330 N. 30th St., Philadelphia 21, Pa.
St., Louisville 1, Ky.
Avondale Marine Ways, Inc., Westwego, La.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Columbia Steel Co., San Francisco 6, Calif.
*Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.
Fort Pitt Bridge Works, Keystone Hotel, Pittsburgh 22, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

BEARINGS (Aluminum, Brass or Bronze)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Ampco Metal, Inc., Dept. S8, Milwaukee 4, Wis.
Bunting Brass & Bronze Co., The, Toledo 9, O.
Cadman, A. W., Mfg. Co., 28th & Smallman Sts., Pittsburgh 22, Pa.
Federal-Mogul Corp., 11031 Shoemaker St., Detroit 13, Mich.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
McGill Mfg. Co., Inc., Valparaiso, Ind.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

BEARINGS (Babbitt)

Bunting Brass & Bronze Co., The, Toledo 9, O.
Federal-Mogul Corp., 11031 Shoemaker St., Detroit 13, Mich.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
National Lead Co., 111 Broadway, New York 6, N. Y.

BEARINGS (Ball)

Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Bearings Co. of America, Lancaster, Pa.
Dodge Manufacturing Co., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
McGill Mfg. Co., Inc., Valparaiso, Ind.
New Departure, Division of General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Philadelphia 32, Pa.
Thomson Industries, Inc., 29-05 Review Ave., Long Island City 1, N. Y.

BEARINGS (Graphite)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Journal)

Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Dodge Manufacturing Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
National Lead Co., 111 Broadway, New York 6, N. Y.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse 4, N. Y.
SKF Industries, Inc., Philadelphia 32, Pa.
Timken Roller Bearing Co., The, Canton 6, O.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Needle)

Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Torrington Co., The, Torrington, Conn.

BEARINGS (Nonmetallic)

Goodrich, B. F., Co., The, Akron 18, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Oilless)

Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
Rhoades, R. W., Metaline Co., Inc., 50-17 Fifth St., Long Island City 1, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Quill)

Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
McGill Mfg. Co., Inc., Valparaiso, Ind.

BEARINGS (Radial)

American Roller Bearing Co., 416-420 Melwood St., Pittsburgh 13, Pa.
Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
New Departure, Div. of General Motors Corp., Bristol, Conn.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse 4, N. Y.
Shafer Bearing Corp., Chicago 7, Ill.
SKF Industries, Inc., Philadelphia 32, Pa.
Timken Roller Bearing Co., The, Canton 6, O.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Roll Neck)

American Roller Bearing Co., 416-420 Melwood St., Pittsburgh 13, Pa.
Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
Morgan Construction Co., Worcester 5, Mass.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse 4, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
SKF Industries, Inc., Philadelphia 32, Pa.
Timken Roller Bearing Co., The, Canton 6, O.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Roller)

American Roller Bearing Co., 416-420 Melwood St., Pittsburgh 13, Pa.
Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Dodge Manufacturing Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse 4, N. Y.
Shafer Bearing Corp., Chicago 7, Ill.
SKF Industries, Inc., Philadelphia 32, Pa.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.
Timken Roller Bearing Co., The, Canton 6, O.

BEARINGS (Roller Tapered)

Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Dodge Manufacturing Corp., Mishawaka, Ind.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Timken Roller Bearing Co., The, Canton 6, O.

BEARINGS (Rolling Mill)

American Roller Bearing Co., 416-420 Melwood St., Pittsburgh 13, Pa.
Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Morgan Construction Co., Worcester 5, Mass.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Shafer Bearing Corp., Chicago 7, Ill.
SKF Industries, Inc., Philadelphia 32, Pa.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Timken Roller Bearing Co., The, Canton 6, O.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Sealed)

Bearings Company of America, Lancaster, Pa.
McGill Mfg. Co., Inc., Valparaiso, Ind.
New Departure, Div. of General Motors, Bristol, Conn.
Shafer Bearing Corp., Chicago 7, Ill.

BEARINGS (Shaft Hanger)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Dodge Manufacturing Corp., Mishawaka, Ind.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Shafer Bearing Corp., Chicago 7, Ill.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BEARINGS (Thrust)

American Roller Bearing Co., 416-20 Melwood St., Pittsburgh 13, Pa.
Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., New Britain, Conn.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Rollway Bearing Co. Inc., 541 Seymour Ave., Syracuse 4, N. Y.
Shafer Bearing Corp., Chicago 7, Ill.
SKF Industries, Inc., Philadelphia 32, Pa.
Timken Roller Bearing Co., The, Canton 6, O.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BELTING (Conveyor)

Boston Woven Hose & Rubber Co., P. O. Box 1071, Boston 3, Mass.
Goodrich, B. F., Co., The, Akron 18, O.
Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Steel Parts Mfg. Corp., Div. of Blackstone Mfg. Co., 226 S. Morgan St., Chicago 7, Ill.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

BELTING (Flat Transmission)

Boston Woven Hose & Rubber Co., P. O. Box 1071, Boston 3, Mass.
Goodrich, B. F., Co., The, Akron 18, O.
Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Manheim Mfg. & Belting Co., Manheim, Pa.

BELTING (V-Drive)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Gates Rubber Co., The, 999 S. Broadway, Denver 17, Colo.
Goodrich, B. F., Co., The, Akron 18, O.
Manheim Mfg. & Belting Co., Manheim, Pa.

BENDING AND STRAIGHTENING MACHINES

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Alliance Machine Co., Alliance, O.
American Broach & Machine Co., Ann Arbor, Mich.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Bigwood, Joshua, & Son, Ltd., Wolverhampton, England.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Hallden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.

BENDING AND STRAIGHTENING MACHINES (Cont'd.)

Kardong Bros., Inc., 346 Buchanan St., Minneapolis 13, Minn.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland 4, O.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.
Littell, F. J., Machine Co., 4165 N. Ravenswood Ave., Chicago 13, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee 10, Wis.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Morgan Engineering Co., The, Alliance, O.
O'Neil-Irwin Mfg. Co., 304 8th Ave., S., Lake City 15, Minn.
Pedrick Tool & Machine Co. 3640 N. Lawrence St., Philadelphia 40, Pa.
Sutton Engineering Co., Bellefonte, Pa.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.
Wean Engineering Co., Inc., The, Warren, O.
Webb Corp., The, Webb City, Mo.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

BENZOL AND TOLUOL RECOVERY PLANTS

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

BILLETS (Alloy & Carbon Steel)

Kloster Steel Corp., 224 N. Justine St., Chicago 7, Ill.
Northwest Steel Rolling Mills, 4315 Ninth Ave., Seattle, Wash.

BILLETS—Aluminum (Forging)

Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

BILLETS (Forging)

Alan Wood Steel Co., Conshohocken, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Harrisburg Steel Corp., Harrisburg, Pa.
Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Pittsburgh-Crucible Div., Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Stanley Works, The, New Britain & Bridgeport, Conn.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

BILLETS AND BLOOMS (Alloy & Carbon Steel) (*Also Stainless)

*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
*Copperweld Steel Co., Warren, O.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
*Follansbee Steel Corp., Pittsburgh 30, Pa.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Harrisburg Steel Corp., Harrisburg, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Keystone Steel & Wire Co., Peoria 7, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Pittsburgh-Crucible Div. Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Standard Steel Works, Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Stanley Works, The, New Britain & Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

BILLETS—ALUMINUM (Forging)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.

BLAST FURNACE AIR CONDITIONING

American Blower Corp., 8111 Tireman Ave., Detroit 4, Mich.
Associated Engineers, Inc., 230 E. Berry St., Ft. Wayne 2, Ind.
Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.

BLAST FURNACE CLEANING (Gas)

McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.

BLAST FURNACE COPPER (Tuyeres, Valve Seats, etc.)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Bartlett-Hayward Div., Koppers Company, Baltimore 3, Md.
Smeeth-Harwood Co., 2401-09 W. Cermak Rd., Chicago 8, Ill.

BLAST FURNACE HOISTS

Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

BLAST FURNACE SPECIALTIES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Brosius, Edgar E., Co., Inc., Sharpsburg P. O., Pittsburgh 15, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.
Pittsburgh Steel Foundry Corp., Glassport, Pa.

BLAST FURNACE STOCK HOUSES

McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.

BLAST FURNACE STOVES

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.

BLAST FURNACES

McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.
Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.

BLOCKS (Chain)

Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.

BLOCKS AND SHEAVES

American Hoist & Derrick Co., St. Paul 1, Minn.

BLOW PIPE SYSTEMS

Detroit Sheet Metal Works, 1300 Oakmont Blvd., Detroit 6, Mich.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.

BLOW PIPES

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.

BLOW PIPES (Oxy-Acetylene)

Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.

BLOWERS & EXHAUSTERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
DeLaval Steam Turbine Co., Trenton 2, N. J.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Roots-Connersville Blower Corp., Connersville, Ind.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

BLUE PRINTING MACHINES AND ACCESSORIES

Wickes Brothers, Saginaw, Mich.

BODIES (Truck)

Budd Co., The, 25th St. & Hunting Park Ave., Philadelphia 32, Pa.

BODIES (Truck-Detachable)

Dempster Brothers, Inc., Knoxville 17, Tenn.

BOILER HEADS

Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—see tubes (Boiler)

BOLT AND NUT MACHINERY

Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.

BOLTS (*Also Stainless)

*Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Chandler Products Corp., Euclid 17, O.
*Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
*National Screw & Mfg. Co., The 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.

BOLTS (Carriage and Machine)

Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Screw & Mfg. Co., The 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.

BOLTS (Connecting Rod)

Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Chandler Products Corp., Euclid 17, O.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Screw & Mfg. Co., The 2440 E. 75th St., Cleveland 4, O.
U. S. Automatic Corp., Amherst, O.

BOLTS (Nonferrous)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
U. S. Automatic Corp., Amherst, O.

BOLTS (Shackle)

Bethlehem Steel Co., Bethlehem, Pa.
Chandler Products Corp., Euclid 17, O.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Russell, Burdsall, & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.
U. S. Automatic Corp., Amherst, O.

BOLTS (Special)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Chandler Products Corp., Euclid 17, O.
Ferry Cap & Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Republic Steeel Corp., Upson Nut Div., Dept ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
U. S. Automatic Corp., Amherst, O.

BOLTS (Spring)

Bethlehem Steel Co., Bethlehem, Pa.
Ferry Cap & Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.
U. S. Automatic Corp., Amherst, O.

BOLTS (Stove)

American Screw Co., Providence 1, R. I.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.

BOLTS (Stove, Recessed Head)

American Screw Co., Providence 1, R. I.
Bristol Co., The, Waterbury 91, Conn.
Chandler Products Corp., Euclid 17, O.
Continental Screw Co., New Bedford Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pheoil Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Russell, Burdsall, & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
U. S. Automatic Corp., Amherst, O.

BOLTS (Track)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
Republic Steel Corp., Upson Nut Div., Dept ST, 1912 Scranton Rd., Cleveland 13, O.

BOOTS (Safety)

Hy-Test Div. International Shoe Co., 1509 Washington Ave., St. Louis 3, Mo.

BORING BARS

Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

BORING MACHINES

Foote-Burt Co., The, Cleveland 8, O.
National Automatic Tool Co. Inc., S. 7th & N Sts., Richmond, Ind.

BORING MILLS

Ex-Cel-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Heald Machine Co., The, Worcester 6, Mass.
Moline Tool Co., 102 20th St., Moline, Ill.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee 14, Wis.

BORING MILLS (Horizontal)

General Engineering & Mfg. Co., 1523 S. 10th St., St. Louis 4, Mo.

BORING MILLS (Vertical)

Bullard Co., The, Bridgeport 2, Conn.
Moline Tool Co., 102 20th St., Moline, Ill.

BORING TOOLS (Carbide Tipped)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington Pa.
Kennametal, Inc., Latrobe, Pa.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

BOXES (Export)

Rathborne, Hair & Ridgway Co., 1440 W. 21st Pl. Chicago 8, Ill.

BOXES (Open Hearth Charging)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Morgan Engineering Co., The, Alliance, O.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Union Steel Castings Div., Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh 1, Pa.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

BOXES (Wire Bound)

Rathborne, Hair & Ridgway Co., 1440 W. 21st Pl., Chicago 8, Ill.

BOXES (Wood)

Rathborne, Hair & Ridgway Co., 1440 W. 21st Pl., Chicago 8, Ill.

BOXES—STEEL (Piling and Piling—Open end)

Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.

BOXES—STEEL (Shop, Rack and Tote)

Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

BRAKE DRUMS

Bethlehem Steel Co., Bethlehem. Pa.
Ladish Co., Cudahy, Wis.

BRAKE LININGS

Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

BRAKES (Electric)

Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1310 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
General Electric Co., Schenectady 5, N. Y.

BRAKES (Hand)

O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Lake City 15, Minn.

BRAZING

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

BRAZING EQUIPMENT

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.

BRICK (Abrasive)

Norton Co., Worcester 6. Mass.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.
Sterling Grinding Wheel, The, Div. of The Cleveland Quarries Co., Tiffin, O.

BRICK (Acid Resisting)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BRICK (Chrome)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

BRICK (Fire Clay)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Robinson Clay Products Co., The, 1100 Second National Bank Bldg., Akron 8, O.

BRICK (Forsterite)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

BRICK (High Alumina)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Norton Co., Worcester 6, Mass.

BRICK (Insulating)—See INSULATING BRICK

BRICK (Ladle)

Globe Brick Co., The, East Liverpool, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

BRICK (Magnesia)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Norton Co., Worcester 6, Mass.

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silica)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

BRICK (Silicon Carbide)

Bay State Abrasive Products Co., Union St., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Norton Co., Worcester 6, Mass.

BRICK (Sleeves, Nozzles, Runners, Tuyeres)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES—BRIDGE (Ore & Coal Handling)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Bedford Foundry & Mach. Co., Bedford, Ind.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia 46, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Clinton Bridge Works, 101 S. Second St., Clinton, Iowa
Fort Pitt Bridge Works, Keystone Hotel, Pittsburgh 22, Pa.
Gage Structural Steel Co., 3123-41 S. Hayne Ave., Chicago 8, Ill.
General American Transportation Corp., 514C Graybar Bldg., New York 17, N. Y.
Ingalls Iron Works Co., The, Birmingham 2, Ala.
Levinson Steel Sales Co., 33 Pride St., Pittsburgh 19, Pa.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Midland Structural Steel Co., 1300-20 S. 54th Ave., Cicero 50, Ill.
Stran Steel Div., Great Lakes Steel Corp. 607 Shelby Ave., Detroit, Mich.

BRIGHT HARDENING & ANNEALING

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.

BROACHES

American Broach & Machine Co., Ann Arbor, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Colonial Broach Co., P. O. Box No. 37, Harper Sta., Detroit 13, Mich.
Detroit Broach Co., Inc., 20201 Sherwood Ave., Detroit 12, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.

BROACHING MACHINES

American Broach & Machine Co., Ann Arbor, Mich.
Cincinnati Milling Machine Co., Cincinnati 9, O
Colonial Broach Co., P. O. Box No. 37, Harper Sta., Detroit 13, Mich.
Foote-Burt Co., The, Cleveland 8, O.

BROACHING PRESSES (Hydraulic)

American Broach & Machine Co., Ann Arbor, Mich.

BRUSHES (Carbon)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BRUSHES (Industrial)

Pittsburgh Plate Glass Co., Brush Div., 3221 Frederick Ave., Baltimore 29, Md.

BUCKETS (Clam Shell, Dragline, Excavating, Grab, Orange Peel, Single Line)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Blaw-Knox Division of Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago 23, Ill.
Erie Steel Construction Co., 961 Geist Rd., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Osgood Co., The, Marion, O.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

BUCKETS (Electric)

Erie Steel Construction Co., 961 Geist Rd., Erie Pa.
Owen Bucket Co., 6013 Breakwater Ave., Cleveland 2, O.

BUCKETS (Elevator)

Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Diamond Mfg. Co., Wyoming, Pa.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.

BUCKETS (Rubber)

Goodrick, B. F., Co., The, Akron 18, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)

Blaw-Knox Div. of Blaw-Knox Co. Blawnox, Pa.
Brosius, Edgar E., Co. Inc., Sharps-Sharpsburg P. O., Pittsburgh 15, Pa.
Erie Steel Construction Co., 961 Geist Rd., Erie, Pa.
Owen Bucket Co., 6013 Breakwater Ave., Cleveland 2, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

BUFFERS

Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Brown-Brockmeyer Co., The, P. O. Box 976, Dayton 1, O.

BUILDINGS (Steel)—See BRIDGES BUILDINGS, ETC.

BULLDOZERS

Beatty Machine & Mfg. Co., 150th & Oaks Sts, Hammond, Ind.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee 10, Wis.
Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Wilson, Lee, Engineering Co., Inc., 20005 Lake Rd., Cleveland 16, O.

BURNERS (Pulverized Coal, Oil, Gas, Combination, Sawdust)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Fort Pitt Bridge Works, Keystone Hotel, Pittsburgh 22, Pa.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.

BURNERS (Pulverized Coal, Oil, Gas, Combination, Sawdust) (Cont'd.)

Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Johnson Gas Appliance Co., 573 "E" Ave., N. W. Cedar Rapids, Iowa.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago 12, Ill.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland 16, O.

BURNISHING, GRINDING, LAPPING OR POLISHING COMPOUNDS

Carborundum Co., The, Niagara Falls, N. Y.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.
Sturgis Products Co., Sturgis, Mich.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia 3, Pa.

BUSHINGS (Ball, for Linear Motions)

Thomson Industries, Inc., 29-05 Review Ave., Long Island City 1, N. Y.

BUSHINGS (Bronze)

Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh 22, Pa.
Federal-Mogul Corp., 11031 Shoemaker St., Detroit 13, Mich.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

BUSHINGS (Jig)

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BUSHINGS (Oilless)

Rhoades, R. W. Metaline Co., Inc., 50-17 Fifth St., Long Island City 1, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

BUTTS

Veeder-Root, Inc., Hartford 2, Conn.

BY-PRODUCT PLANTS

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

CABINETS (Refrigeration)

Westinghouse Electric Corp., Mansfield, O.

CABINETS (Steel)

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Republic Steel Corp., Berger Mfg. Div., Canton 5, O.

CABLE (Electric)—See WIRE & CABLE (Electric)

CADMIUM

New Jersey Zinc Co., 160 Front St., New York 7, N. Y.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.

CADMIUM PLATING PROCESSES AND EQUIPMENT

duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.

CALCIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.

CAMERAS

Eastman Kodak Co., 343 State St., Rochester 4, N. Y.

CAMSHAFTS

Ladish Co., Cudahy, Wis.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAPSTANS (Electric, Gasoline, Diesel)

American Hoist & Derrick Co., St. Paul 1, Minn.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

CAR DUMPERS

Alliance Machine Co., The, Alliance, O.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

CAR PULLERS and SPOTTERS

American Hoist & Derrick Co., St. Paul 1, Minn.
Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Cullen-Friestedt Co., 1308 S. Kilbourne Ave., Chicago 23, Ill.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.

CARBIDE

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
National Carbide Corp., 60 E. 42nd St., New York 17, N. Y.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Shawinigan Products Corp., Empire State Bldg., New York 1, N. Y.

CARBIDE METALS (Special Parts)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kennametal, Inc., Latrobe, Pa.

CARBIDE TOOLS (Steel Cutting)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kennametal, Inc., Latrobe, Pa.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

CARBON SPECIALTIES

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

CARBURIZING (Pack or Gas)

Follansbee Steel Corp., Third & Liberty Sts., Pittsburgh 30, Pa.
U. S. Automatic Corp., Amherst, O.

CARS (Charging)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

CARS (Dump)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Bethlehem Steel Co., Bethlehem, Pa.
Differential Steel Car Co., Findlay, O.
Pressed Steel Car Co. Inc., (Industrial Div.) Grant Bldg., Pittsburgh 19, Pa.

CARS (Hot Metal Transfer)

Bartlett Hayward Div., Koppers Co., Baltimore 3, Md.
Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.

CARS (Industrial and Mining)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Differential Steel Car Co., Findlay, O.
Greenville Steel Car Co., Greenville, Pa.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.
Pressed Steel Car Co., Inc., (Industrial Div.) Grant Bldg., Pittsburgh 19, Pa.

CARS (Scale)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.

CASTERS

Rapids Standard Co., Inc., The, Peoples Natl. Bank Bldg., Grand Rapids 2, Mich.

CASTING EQUIPMENT (Precision)

Kerr Manufacturing Co., 6081-94 Twelfth St., Detroit 8, Mich.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

CASTING MACHINES (Centrifugal)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Kerr Manufacturing Co., 6081-94 Twelfth St., Detroit 8, Mich.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

CASTING WASHER EQUIPMENT

Pangborn Corporation, Hagerstown, Md.

CASTINGS (Acid Resisting)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh 22, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
International Nickel Co. Inc., The, 67 Wall St., New York 5, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Ohio Steel Foundry Co., Lima & Springfield, O.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

CASTINGS (Alloy Iron)

Bethlehem Steel Co., Bethlehem, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Alloy Steel)

Advance Foundry Co., The, 119 Seminary Ave., Dayton 3, O.
Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Michiana Products Corp., Michigan City, Ind.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, and Springfield, O.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Union Steel Castings Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh 1, Pa.
United Engineering & Foundry Co., 1st National Bank Bldg., Pittsburgh 22, Pa.

CASTINGS (Aluminum, Brass, Bronze, Copper)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Bunting Brass & Bronze Co., The, Toledo 9, O.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh 22, Pa.
Century Foundry Co., 3727 Market St., St. Louis 10, Mo.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Scott Aviation Corp., Lancaster, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.
Smeeth-Harwood Co., 2401-09 W. Cermak Rd., Chicago 8, Ill.
Utica Radiator Corp., Utica 1, N. Y.

CASTINGS (Centrifugal)

Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Michiana Products Corp., Michigan City, Ind.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Ohio Steel Foundry Co., Lima & Springfield, O.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

CASTINGS (Corrosion Resisting)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Michiana Products Corp., Michigan City, Ind.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

National Lead Co., 111 Broadway, New York 6, N. Y.
Ohio Steel Foundry Co., Lima & Springfield, O.
Reynolds Metal Co., 2520 S. Third St., Louisville 1, Ky.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

CASTINGS (Electric Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Clark Equipment Co., Buchanan, Mich.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Crucible Steel Casting Co., Lansdowne, Del. Co., Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
National Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima & Springfield, O.
Reading Steel Casting Div. of American Chain & Cable Co., Inc., Reading, Pa.

CASTINGS (Gray Iron, Alloy or Semi-Steel)

Advance Foundry Co., The, 119 Seminary Ave., Dayton 3, O.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Bedford Foundry & Mach. Co., Bedford, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Century Foundry Co., 3727 Market St., St. Louis 10, Mo.
Columbia Steel Co., San Francisco 6, Calif.
Davenport Besler Corp., Davenport, Iowa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Oil Well Supply Co., Dallas 1, Tex.
Ottumwa Iron Works, Ottumwa, Ia.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.

CASTINGS (Heat Resisting)

Advance Foundry Co., The, 119 Seminary Ave., Dayton 3, O.
Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
International Nickel Co. Inc., The, 67 Wall St., New York 5, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Michiana Products Co., Michigan City, Ind.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Ohio Steel Foundry Co., Lima & Springfield, O.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

CASTINGS (Magnesium)

American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Light Metals, Inc., 1100-1198 E. 24th St., Indianapolis 5, Ind.
Utica Radiator Corp., Utica 1, N. Y.

CASTINGS (Malleable)

American Chain Div. American Chain & Cable Co., Inc., York, Pa.
Central Foundry Div., General Motors Corp., Saginaw, Mich.
Lake City Malleable Co., The, 5026 Lakeside Ave., Cleveland 14, O.

CASTINGS (Permanent-Mold)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O.
Eaton Manufacturing Co., Foundry Div., 9771 French Rd., Detroit 13, Mich.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Stewart-Warner Corp., Stewart Die Casting Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

CASTINGS (Precision, Lost Wax Process)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.

CASTINGS (Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept S-47, Brackenridge, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Central Foundry Div., General Motors Corp., Saginaw, Mich.
Columbia Steel Co., San Francisco 6, Cal.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Crucible Steel Casting Co., Lansdowne, Del. Co., Pa.
Falk Corporation, The, Milwaukee 8, Wis.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
*Lebanon Steel Foundry, Lebanon, Pa.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh 8, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
*Michiana Products Co., Michigan City, Ind.
*Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Erie Corp., Erie, Pa.
*Ohio Steel Foundry Co., Lima & Springfield, O.
Oil Well Supply Co., Dallas 1, Tex.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, O.
Strong Steel Fdry. Co., Hertel & Norris Aves., Buffalo 7, N. Y.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Union Steel Castings Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh 1, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.

CASTINGS (Wear Resisting)

Bethlehem Steel Co., Bethlehem, Pa.
Central Foundry Div., General Motors Corp., Saginaw, Mich.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Michiana Products Corp., Michigan City, Ind.
National Alloy Steel Div., Blaw-Knox Co., Blawnox, Pa.
Ohio Steel Foundry Co., Lima & Springfield, O.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.
Taylor-Wharton Iron & Steel Co., Easton, Pa.

CASTINGS (Worm and Gear Bronze)

Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Cadman, A. W., Mfg. Co., 28th & Smallman Sts., Pittsburgh 22, Pa.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

CEMENT (Acid Proof)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

CEMENT (High Temperature)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Bay State Abrasive Products Co., Union St., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
Lumnite Div. Universal Atlas Cement Co., Dept. S Chrysler Bldg., New York 17, N. Y.
Norton Co., Worcester 6, Mass.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

CEMENT (High Temperature Hydraulic)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.

CENTRAL STATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
General Electric Co., Schenectady 5, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)

Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Cleveland Chain & Mfg. Co., The, Broadway & Henry Rd., Cleveland 5, O.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Union Chain & Mfg. Co., Sandusky, O.

CHAIN (Draw Bench)

Cleveland Chain & Mfg. Co., The, Broadway & Henry Rd., Cleveland 5, O.
Union Chain & Mfg. Co., Sandusky, O.

CHAIN (Malleable)

Cleveland Chain & Mfg. Co., The, Broadway & Henry Rd., Cleveland 5, O.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Lake City Malleable Co., The, 5026 Lakeside Ave., Cleveland 14, O.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.

CHAIN (Power Transmission)

Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Morse Chain Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Sandusky, O.

CHAIN (Roller)

Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Morse Chain Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Sandusky, O.

CHAIN (Silent)

Morse Chain Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Sandusky, O.

CHAIN (Sling)

American Chain Div., American Chain & Cable Co., Inc., York, Pa.
Cleveland Chain & Mfg. Co., The, Broadway & Henry Rd., Cleveland 5, O.
Columbus-McKinnon Chain Corp., 118 Fremont Ave., Tonawanda, N. Y.

CHAIN (Welded & Weldless)

American Chain Div., American Chain & Cable Co., Inc., York, Pa.
Baldt Anchor, Chain & Forge Div. of The Boston Metals Co., Chester, Pa.
Cleveland Chain & Mfg. Co., The, Broadway & Henry Rd., Cleveland 5, O.
Columbus-McKinnon Chain Corp., 118 Fremont Ave., Tonawanda, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.

CHANNELS—See BEAMS, CHANNELS, ANGLES

CHARGING BOXES

Pittsburgh Steel Foundry Corp., Glassport, Pa.
Union Steel Castings Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh 1, Pa.

CHARGING MACHINES (Cupola)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)

Brosius, Edgar E., Co. Inc., Sharpsburg P. O., Pittsburgh 15, Pa.
Morgan Engineering Co., The, Alliance, O.

CHECKER BRICK

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.

CHECKS (Metal)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh 19, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

CHEMICAL PROCESSING EQUIPMENT

Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Struthers Wells Corp., Titusville, Pa.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

CHEMICALS (Industrial)

Aluminum Co. of America, Chemicals Div., Oliver Bldg. Pittsburgh 22, Pa.
American Chemical Paint Co., Ambler, Pa.
duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
General Chemical Co., 40 Rector St., New York 6, N. Y.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Pennsylavnia Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

CHEMICALS (Laboratory)

Baker & Adamson Div. General Chemical Co., 40 Rector St., New York 6, N. Y.

CHISEL BLANKS

Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Marchant, George F., Co., 1420 S. Rockwell St., Chicago 8, Ill.

CHROME MORTAR

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

CHROME ORE

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

CHROMIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

CHROMIUM PLATING PROCESSES AND EQUIPMENT

duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y.

CHUCKING MACHINES (Multiple Spindle)

Bullard Co., The, Bridgeport 2, Conn.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.
New Britain Machine Co., New Britain, Conn.

CHUCKS

Bullard Co., The, Bridgeport 2, Conn.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

CLAMPS, CABLE (Sheet Metal)

Budd Co., The, 25th St & Hunting Park Ave., Philadelphia 32, Pa.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland 13, O.

CLAMPS (Drop Forged)

Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

CLAMPS (Toggle)

Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.
Knu-Vise Products Co., 2200 8th Ave., Detroit 16, Mich.

CLEANERS (Oil and Grease Absorbent)

Waverly Petroleum Products Co., Drexel Bldg., Philadelphia 6, Pa.

CLEANERS (Steam)

Detrex Corp., Detroit 32, Mich.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia 7, Pa.

CLEANERS AND FILTERS (Air)

American Air Filter Co., Inc., 443 Central Ave., Louisville 8, Ky.
Bellows Senacon Co., The, 798 N. Main St., Akron 10, O.
Besco Products Co., 11810 Euclid Ave., Cleveland 6, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Westinghouse Electric Corp., 1216 W. 58th St., Cleveland 1, O.

CLEANING EQUIPMENT (Metal)

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Bullard Co., The, Bridgeport 2, Conn.
Detrex Corporation, Detroit 32, Mich.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Pangborn Corporation, Hagerstown, Md.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati 16, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Wean Engineering Co., Inc., The, Warren, O.

CLEANING SPECIALTIES

American Chemical Paint Co., Ambler, Pa.
Detrex Corporation, Detroit 32, Mich.
duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.
Kondor Products Corp., West Clifton Blvd. at Sloane, Cleveland 7, O.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia 7, Pa.

CLIPS (Wire Rope)

American Hoist & Derrick Co., St. Paul 1, Minn.

CLUTCH FACINGS

Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

CLUTCHES (Free Wheeling)

Morse Chain Co., Ithaca, N. Y.

CLUTCHES (Friction)

Dodge Manufacturing Corp., Mishawaka, Ind.
Falk Corporation, The, Milwaukee 8, Wis.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago 24, Ill.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Morse Chain Co., Ithaca, N. Y.

CLUTCHES (Magnetic)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.

COAL OR COKE

Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland 14, O.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Koppers Coal Div., Eastern Gas & Fuel Assoc., 300 Koppers Bldg., Pittsburgh 19, Pa.
New England Coal & Coke Co., Boston 16, Mass.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh 22, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh 22, Pa.

COAL, COKE, ORE, ASH HANDLING AND PROCESSING MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Bethlehem Steel Co., Bethlehem, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Robins Conveyors, Inc., Div. of Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Thew Shovel Co., The, Lorain, O.

COATINGS (Plastic Packaging)

Better Finishes & Coatings Inc., 268 Doremus Ave., Newark 5, N. J.

COILERS (Strip & Wire)

Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh 30, Pa.

COILS (Direct Expansion)

Westinghouse Electric Corp., 653 Page Blvd., Springfield 2, Mass.

COILS (Electrical)

Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

COILS (Water or Steam)

Westinghouse Electric Corp., 653 Page Blvd., Springfield 2, Mass.

COKE—See COAL or COKE

COKE OVEN MACHINERY

Alliance Machine Co., The, Alliance, O.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

COKE OVEN (By-Product)

Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

COLLET CHUCKS

Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

COLLETS

Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

COLUMBIUM

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.

COMBUSTION BOATS

Carborundum Co., The, Niagara Falls, N. Y.
Central Scientific Co., 1700 Irving Park Rd., Chicago 13, Ill.
Norton Company, Worcester 6, Mass.

COMBUSTION CONTROLS

Bristol Co., The, Waterbury 91, Conn.
Morgan Construction Co., Worcester 5, Mass.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

COMPARATORS (Internal & External)

Jack & Heintz Precision Industries, Inc., Cleveland 1, O.

COMPARATORS (Optical)

Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)

Cutler-Hammer, Inc., 1310 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
General Electric Co., Schenectady 5, N. Y.
Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.
Westinghouse Electric Corp., Dept. 7N, E. Pittsburgh, Pa.

COMPOUNDS (Case Hardening, Heat Treating)

duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

COMPOUNDS (Copper, Metal Finishing, Rust Removing, Rust Preventing)

American Chemical Paint Co., Ambler, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Kondor Products Corp., West Clifton Blvd. at Sloane, Cleveland 7, O.
Oakite Products Inc., 34E Thames St., New York 6, N. Y.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.
Rheem Research Products, Inc., 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.

COMPOUNDS (Drawing & Stamping)

Brooks Oil Co., 315 E. Carson St., Pittsburgh 19, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Oakite Products Inc., 34E Thames St., New York 6, N. Y.

COMPOUNDS (Floor Cleaning)

Detrex Corp., Detroit 32, Mich.
Oakite Products Inc., 34E Thames St., New York 6, N. Y.

COMPOUNDS (For Deep, Die Hot Forgings)

Brooks Oil Co., 315 E. Carson St., Pittsburgh 19, Pa.

COMPRESSORS (Air)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis 20, Mo.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Metallizing Co. of America, 1330 W. Congress St., Chicago 7, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.
Sturtevent, B. F. Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

COMPRESSORS (Refrigeration & Air Conditioning)

Jack & Heintz Precision Industries, Inc., Cleveland 1, O.

CONCRETE (Heat Resistant)

Babcock & Wilcox Co., Refractories Div., 85 Liberty St. New York 6, N. Y.
Lumnite Div. Universal Atlas Cement Co., Dept. S, Chrysler Bldg., New York 17, N. Y.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Evaporative)

Niagara Blower Co., Dept. S-105, 405 Lexington Ave., New York 17, N. Y.

CONDENSERS (Surface, Barometric, Multi-Jet)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Harrisburg Steel Corp., Harrisburg, Pa.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Ross Heater & Mfg. Co., Inc., 1431 West Ave., Buffalo 13, N. Y.
Westinghouse Electric Corp., 653 Page Blvd., Springfield 2, Mass.

CONDUITS (Asbestos Cement)

Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

CONDUITS (Electric)

Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.
General Electric Co., Schenectady 5, N. Y.

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Steel and Tubes Div., Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

CONDUITS (Wood)

Koppers Co., Wood Preserving Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

CONNECTING RODS

Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.

CONTACTS & CONTACTORS (Electric)

Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1310 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

CONTAINERS (Shipping)

Rathborne, Hair & Ridgway Co., 1440 W. 21st Pl., Chicago 8, Ill.

CONTRACT WORK

Agerstrand Corp., Muskegon, Mich.
Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Atlas Metal Stamping Co., Castor & Kensington Aves., Philadelphia 24, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Bridgewater Screw Products Co., Bridgewater, Mass.
Budd Co., The, 25th St. & Hunting Park Ave., Philadelphia 32, Pa.
Falk Corporation, The, Milwaukee 8, Wis.
Gerding Bros., 5 E. Third St., Cincinnati 2, O.
Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.
Warren City Mfg. Co., Warren, O.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL EQUIPMENT (Electric)

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bristol Co., The, Waterbury 91, Conn.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1310 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

CONTROL SYSTEMS (Automatic)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Bristol Co., The, Waterbury 91, Conn.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

CONTROL SYSTEMS (Office, Tool Production Materials)

Remington Rand Inc., Systems Div., 315 Fourth Ave., New York 10, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Bristol Co., The, Waterbury 91, Conn.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

CONVEYING SYSTEMS (Steam Jet)

Hagan, George J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.

CONVEYOR BELTS

Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Manheim Mfg. & Belting Co. Manheim, Pa.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

CONVEYOR BELTS (High & Low Temperature)

Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Steel Parts Mfg. Corp. Div. of Blackstone Mfg. Co., 226 S. Morgan St., Chicago 7, Ill.
Wickwire Spencer Steel, Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

CONVEYOR BELTS (Wire)

Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Wickwire Spencer Steel, Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

CONVEYOR PULLEYS

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Robins Conveyors, Inc., Div. of Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

CONVEYORS (Apron)

Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Logan Co., Inc., 536 Cabel St., Louisville 6, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.
Union Chain & Mfg. Co., Sandusky, O.

CONVEYORS (Belt)

Bartlett, C. O. & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Logan Co., Inc., 536 Cabel St., Louisville 6, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Rapids Standard Co., Inc., The, Peoples Natl. Bank Bldg., Grand Rapids 2, Mich.
Robins Conveyors, Inc., Div. of Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.
Steel Parts Mfg. Corp. Div. of Blackstone Mfg. Co., 226 S. Morgan St., Chicago 7, Ill.

CONVEYORS (Chain)

Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Logan Co., Inc., 536 Cabel St., Louisville 6, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit 12, Mich.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.
Union Chain & Mfg. Co., Sandusky, O.

CONVEYORS (Drag)

Mathews Conveyer Co., Ellwood City, Pa.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.

CONVEYORS (Elevating)

Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Logan Co., Inc., 536 Cabel St., Louisville 6, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit 12, Mich.
Robins Conveyors, Inc., Div. of Hewitt-Robins, Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.

CONVEYORS (Overhead)

Mathews Conveyer Co., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Mathews Conveyer Co., Ellwood City, Pa.
Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit 12, Mich.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.

CONVEYORS (Pneumatic)

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

CONVEYORS (Portable)

Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Logan Co. Inc., 536 Cabel St., Louisville 6, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Rapids Standard Co., Inc., The, Peoples Natl. Bank Bldg., Grand Rapids 2, Mich.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.

CONVEYORS (Roller—Power and Gravity)

Logan Co., Inc., 536 Cabel St., Louisville 6, Ky.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.

CONVEYORS (Slat)

Logan Co., Inc., 536 Cabel St., Louisville 6, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Union Chain & Mfg. Co., Sandusky, O.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CONVEYORS (Wheel—Gravity)

Logan Co. Inc., 536 Cabel St., Louisville 6, Ky.
Rapids Standard Co., Inc., The, Peoples Natl. Bank Bldg., Grand Rapids 2, Mich.
Standard Conveyor Co., 315 Second Ave., N. St. Paul 9, Minn.

COOLERS (Liquid, Compressed Air, Gas)

Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y.
Ross Heater & Mfg. Co., Inc., 1431 West Ave., Buffalo 13, N. Y.

COPPER—See METALS (Nonferrous)

COPPER (Phosphorized)

American Brass Co., The, Waterbury 88, Conn.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

COTTER PINS

American Chain Div., American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.

COUNTERBORES

Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Scully-Jones & Co. 1901 S. Rockwell St., Chicago 8, Ill.
Super Tools Co., 21650 Hoover Rd., Detroit 13, Mich.

COUNTING DEVICES

Veeder-Root, Inc., Hartford 2, Conn.

COUPLINGS (Chain)

Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Morse Chain Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Sandusky, O.

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Falk Corporation, The, Milwaukee 8, Wis.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote Bros. Gear & Machine Co., 5225 S. Western Blvd., Chicago 9, Ill.
General Electric Co., Schenectady 5, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.
Lovejoy Flexible Coupling Co., 5071 W. Lake St., Chicago 44, Ill.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Morse Chain Co., Ithaca, N. Y.
Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Poole Fdy. & Mach. Co., Woodberry, Baltimore 11, Md.
Union Chain & Mfg. Co., Sandusky, O.
Waldron, John, Corp., New Brunswick, N. J.
Westinghouse Electric Corp., 200 McCandless Ave., Pittsburgh 1, Pa.

COUPLINGS (Hose)

Goodrich, B. F., Co., The, Akron 18, O.
Hansen Manufacturing Co., The, 1786 E. 27th St., Cleveland 14, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

COUPLINGS (Pipe)

Bethlehem Steel Co., Bethlehem, Pa.
Harrisburg Steel Corp., Harrisburg, Pa.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.

COUPLINGS (Pipe) (Cont'd.)
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

CRADLES (Coil)
Littell, F. J., Machine Co., 4165 N. Ravenswood Ave., Chicago 13, Ill.

CRANES (Charging)
Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, O.
American Hoist & Derrick Co., St. Paul 1, Minn.
American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Bedford Foundry & Mach. Co., Bedford, Ind.
Browning, Victor R., Co., Inc., Willoughby, O.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago 23, Ill.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Thew Shovel Co., The, Lorain, O.
Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Bedford Foundry & Mach. Co., Bedford, Ind.
Chisholm-Moore Hoist Corp., 118 Fremont Ave., Tonawanda, N. Y.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave. St. Louis 20, Mo.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANES (Jib)
Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Bedford Foundry & Mach. Co., Bedford, Ind.
Chisholm-Moore Hoist Corp., 118 Fremont Ave., Tonawanda, N. Y.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
Euclid Crane & Hoist Co., The, 2102 Adams St., Reading, Pa.
Industrial Brownhoist Corp., 1365 Chardon Rd., Euclid, O.
Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
Thew Shovel Co., The, Lorain, O.
Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANES (Locomotive)
American Hoist & Derrick Co., St. Paul 1, Minn.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago 23, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Osgood Co., The, Marion, O.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave. Cleveland 7, O.
Chisholm-Moore Hoist Corp., 118 Fremont Ave., Tonawanda, N. Y.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-propelled)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland 13, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Hughes-Keenan Co., 585 Newman St., Mansfield, O.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Osgood Co., The, Marion, O.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
Thew Shovel Co., The, Lorain, O.
Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.

CRANES (Traveling)
American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Bedford Foundry & Mach. Co., Bedford, Ind.
Chisholm-Moore Hoist Corp., 118 Fremont Ave., Tonawanda, N. Y.
Erie Steel Construction Co., 961 Geist Rd., Erie, Pa.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANES, BRIDGE (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, O.
Browning, Victor R., Co., Inc., Willoughby, O.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

CRANKSHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Ladish Co., Cudahy, Wis.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Ohio Crankshaft Co., The, 3800 Harvard Ave., Cleveland 1, O.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

CRAYONS (Metal Marking)
American Crayon Co., Sandusky, O.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

CRUSHERS
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Pulverizer Co., 1539 Macklind Ave., St. Louis 10, Mo.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Gruendler Crusher & Pulverizer Co., 2915-17 N. Market St., St. Louis 6, Mo.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.

CUPOLA LININGS
Robinson Clay Products Co., The, 1100 Second National Bank Bldg., Akron 8, O.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.

CUTTERS (Bar and Bar Products)
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Scully Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Gear Shaper)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.

CUTTERS (Herringbone Gear)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.

CUTTERS (Sheet Metal)
Beverly Shear Co., 3004 W. 111th St., Chicago 43, Ill.

CUTTERS (Thread Milling)
Barber-Colman Co., 150 Loomis St., Rockford, Ill.
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.

CUTTERS (Wire and Cable)
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS & COMPOUNDS (Cutting)

CUTTING-OFF MACHINES (Abrasive)
Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Campbell, Andrew C., Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn.
Landis Machine Co., Waynesboro, Pa.

CUTTING-OFF MACHINES (Rotary)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, O.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

CYANIDING
Pittsburgh Commercial Heat Treating Co., 49th St., & A.V.R.R., Pittsburgh 1, Pa.
U. S. Automatic Corp., Amherst, O.

CYLINDERS (Air or Hydraulic)
Bellows Senacon Co., The, 798 N. Main St., Akron 10, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis 20, Mo.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee 7, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.
Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.

CYLINDERS (Pressure)
Bethlehem Steel Co., Bethlehem, Pa.
Harrisburg Steel Corp., Harrisburg, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Taylor-Wharton Iron & Steel Co., Easton, Pa.

DEGREASERS
American Chemical Paint Co., Ambler, Pa.
Detrex Corporation, Detroit 32, Mich.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Pennsylvania Salt Mfg. Co. Dept. S, Pennsalt Cleaner Div., Philadelphia 7, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.

DEHUMIDIFIERS
Pittsburgh Lectrodryer Corp., P.O. Box 1766, Pittsburgh, Pa.

DEMAGNETIZERS
Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.

DEODORANT (Plant Sanitation)
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.

DEOXIDIZERS
duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Electro Refractories & Alloys Corp., Vars bldg., Buffalo 2, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

DERRICKS (Steel Stiffleg, Barge or Guy)
American Hoist & Derrick Co., St. Paul 1, Minn.
Bedford Foundry & Machine Co., Bedford, Ind.

DESCALING PROCESSES AND EQUIPMENT
Air Reduction, 60 E. 42nd St., New York 17, N. Y.
American Chemical Paint Co., Ambler, Pa.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Bullard Co., The, Bridgeport 2, Conn.
duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

DESIGNERS (Product)
Atlas Tool & Designing Co., Castor & Kensington Aves., Philadelphia 24, Pa.

DIAMOND WHEELS
Norton Co., Worcester 6, Mass.

DIAMONDS (Wheel Dressing)

Diamond Tool Co., 933 E. 41st St., Chicago 15, Ill.

DIE BLOCKS

Advance Foundry Co., The, 119 Seminary Ave., Dayton 3, O.
American Shear Knife Co., P.O. Box 355, Homestead, Pa.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
Holliday, W. J., & Co., Hammond, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.

DIE CASTINGS (Aluminum, Magnesium, Zinc)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Stewart-Warner Corp., Stewart Die Casting Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

DIE CENTERS

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kennametal, Inc., Latrobe, Pa.

DIE HEADS

Jones & Lamson Machine Co., Springfield, Vt.
Lardis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.

DIE SETS

Advance Foundry Co., The, 119 Seminary Ave., Dayton 3, O.
Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.

DIE-SINKING MACHINES

Cincinnati Milling Machine Co., Cincinnati 9, O.

DIES (Compression Riveter)

Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Marchant, George F., Co., 1420 S. Rockwell St., Chicago 8, Ill.

DIES (Forging)—See FORGING DIES

DIES (Notching)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.

DIES (Perforating)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.
Marchant, George F., Co., 1420 S. Rockwell St., Chicago 8, Ill.

DIES (Punching, Stamping, Blanking)

Advance Foundry Co., The, 119 Seminary Ave., Dayton 3, O.
Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Budd Co., The, 25th St. & Hunting Park Ave., Philadelphia 32, Pa.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.
Marchant, George F., Co., 1420 S. Rockwell St., Chicago 8, Ill.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.
Zeh & Hahnemann Co., 56 Avenue A, Newark 5, N. J.

DIES (Roller)

National Roll & Machine Co., 954 Ansel Rd., Cleveland 3, O.

DIES (Steel, Embossing)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh 19, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

DIES (Trimming)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Poulsen & Nardon, Inc., 2665 Leonis Blvd., Los Angeles 11, Cal.
Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.

DIES AND CHASERS (Threading)

Landis Machine Co., Waynesboro, Pa.

DIFFERENTIALS

Fairfield Manufacturing Co., 803 S. Earl Ave., Lafayette, Ind.

DIPPERS (Rubber)

Goodrich, B. F., Co., The, Akron 18, O.

DIPPING MACHINES (Monorail)

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

DISCS (Abrasive)

Armour & Co., Sandpaper Div., 1355 W. 31st St., Chicago 9, Ill.
Carborundum Co., The, Niagara Falls, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd. Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

DITCHERS

American Hoist & Derrick Co., St. Paul 1, Minn.

DOLOMITE—FLUX AND REFRACTORIES

Baker, The J. E., Co., 114 N. George St., York, Pa.
Basic Refractories, Inc., Hanna Bldg., Cleveland 15, O.

DOORS & SHUTTERS (Steel, Wood Rolling—Service, Fire)

Kinnear Mfg. Co., The, 1730-1800 Fields Ave., Columbus 16, O.
Mahon, R. C., Co., The, 3650 Mt. Elliott Ave., Detroit 11, Mich.

DOWEL PINS (Steel)

Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.

DRAFT GAGES (Indicating, Recording)

Bristol Co., The, Waterbury 91, Conn.

DRAGLINES (Crawler)

Northwest Engieering Co., 28E. Jackson Blvd., Chicago 4, Ill.
Thew Shovel Co., The, Lorain, O.

DRAW BENCHES

Aetna-Standard Engineering Co., The, Home Savings Bank Bdlg., Youngstown 1, O.
Bigwood, Joshua, & Son Ltd., Wolverhampton, England.
McKay Machine Co., The, 546 W. Rayen St., Youngstown 2, O.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRESSERS (Grinding Wheel)

Carborundum Co., The, Niagara Falls, N. Y.
Diamond Tool Co., 933 E. 41st St., Chicago 15, Ill.
Norton Co., Worcester 6, Mass.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.

DRILL HEADS

Ex-Cell-O Corp., 1223 Oakman Blvd., Detroit 6, Mich.
Thomson Industries, Inc., 29-05 Review Ave., Long Island City 1, N. Y.

DRILL RODS—See RODS (Drill)

DRILLING MACHINERY

Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati 9, O.
Foote-Burt Co., The, Cleveland 8, O.
Guibert Steel Co., P.O. Box 1837, Pittsburgh 30, Pa.

DRILLING MACHINES (Horizontal)

Foote-Burt Co., The, Cleveland 8, O.
General Engineering & Mfg. Co., 1523 S. 10th St., St. Louis 4, Mo.
National Automatic Tool Co., Inc., S. 7th & N Sts., Richmond, Ind.

DRILLING MACHINES (Radial)

Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati 9, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Foote-Burt Co., The, Cleveland 8, O.
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.

DRILLING MACHINES (Vertical)

Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago 6, Ill.
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati 9, O.
Cleereman Machine Tool Co., Green Bay, Wis.
Foote-Burt Co., The, Cleveland 8, O.
Moline Tool Co., 102 20th St., Moline, Ill.
National Automatic Tool Co., Inc., S. 7th & N Sts., Richmond, Ind.
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.

DRILLS (Electric Portable)

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.

DRILLS (Pneumatic)

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)

Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh 22, Pa.
Union Chain & Mfg. Co., Sandusky, O.

DRIVES (Flat-Belt)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.

DRIVES (Helical & Herringbone)

Falk Corporation, The, Milwaukee 8, Wis.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote Bros. Gear & Machine Co., 5226 S. Western Blvd., Chicago 9, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh 3, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Philadelphia Gear Works, Inc., Erie Ave. & G Sts., Philadelphia 34, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.
Westinghouse Electric Corp., 200 McCandless Ave., Pittsburgh 1, Pa.

DRIVES (Multi-V-Belt)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Dodge Manufacturing Corp., Mishawaka, Ind.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.

DRUMS (Steel)

Rheem Research Products, Inc., 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.
Wheeling Steel Corp., Wheeling, W. Va.

DRY CLEANING EQUIPMENT

Detrex Corporation, Detroit 32, Mich.

DRYERS (Compressed Air)

Pittsburgh Lectrodryer Corp., P.O. Box 1766, Pittsburgh, Pa.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee 12, Wis.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

DRYERS (Paint, Varnish, Enamel, Chemical)

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago 12, Ill.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Struthers Wells Corp., Titusville, Pa.
Wagner Litho Machinery Co., Hoboken, N. J.

DRYERS & COOLERS (Rotary)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett, C. O., & Snow Co., The 6200 Harvard Ave., Cleveland 5, O.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.

DUCTS (Acid Fume, Rubber Lined)

Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

DUPLICATING EQUIPMENT

Ozalid Products Div., General Analine & Film Corp., Johnson City, N. Y.

DUST ARRESTING EQUIPMENT

American Air Filter Co., Inc., 443 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Brown-Brockmeyer Co., The, P.O. Box 976, Dayton 1, O.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Panglorn Corporation, Hagerstown, Md.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee 12, Wis.
Schneible, Claude B., Co., 2827 25th St., Detroit 16, Mich.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Westinghouse Electric Corp., 1216 W. 58th St., Cleveland 1, O.

ECONOMIZERS

Salem Engineering Co., 714 S. Broadway, Salem, O.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

ELECTRICAL EQUIPMENT

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Master Electric Co., The, 100 Davis Ave., Dayton 1, O.
Square D Co., 6060 Rivard St., Detroit 11, Mich.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.
Ward Leonard Electric Co., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

ELECTRODE HOLDERS (Welding)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Hobart Bros. Co., The, Box St. 172, Troy, O.
Lincoln Electric Co., The, Cleveland 1, O.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Tweco Products Co., Wichita 1, Kan.

ELECTRODES (Alloy) (*Also Stainless)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
*Allegheny Ludlum Steel Corp., Dept. S-17, Brackenridge, Pa.
*Alloy Rods Co., York, Pa.
Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
*General Electric Co., Schenectady 5, N. Y.
*Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Lincoln Electric Co., The, Cleveland 1, O.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
*Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

ELECTRODES (Carbon and Graphite)

Central Scientific Co., 1700 Irving Park Rd., Chicago 13, Ill.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELECTRODES (Hard Surfacing Welding)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.
General Electric Co., Schenectady 5, N. Y.
Lincoln Electric Co., The, Cleveland 1, O.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

ELECTRODES (Resistance Welding)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

ELECTRONIC CONTROL

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Westinghouse Electric Corp., Dept. 7 N.-E. Pittsburgh, Pa.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

END MILLS

Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.

ENGINEERS (Consulting)

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Associated Engineers, Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Atlas Tool & Designing Co., Castor & Kensington Aves., Philadelphia 24, Pa.
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.
Rheem Research Products, Inc., 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Warren City Mfg. Co., Warren, O.

ENGINEERS (Management)

Associated Engineers, Inc., 230 E. Berry St., Fort Wayne 2, Ind.

ENGINEERS AND CONTRACTORS

Associated Engineers, Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
McGraw, F. H., Co., 51 W. 42nd St., New York 17, N. Y.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Morgan Engineering Co., The, Alliance, O.
Warren City Mfg. Co., Warren, O.
Wean Engineering Co., Inc., The, Warren, O.

ENGINES (Diesel)

Cooper-Bessemer Corp., The, Mt. Vernon, O.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

ENGINES (Gas, Oil)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Ingersoll-Rand Co., 11 Broadway New York 4, N. Y.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Propulsion Engine Corp., 7th & White Eagle Rd., Kansas City, Kans.
Wisconsin Motor Corp., Milwaukee 14, Wis.

ENGINES (Steam)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Oil Well Supply Co., Dallas 1, Tex.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

EVAPORATORS

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Struthers Wells Corp., Titusville, Pa.

EXCAVATORS

Northwest Engineering Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Osgood Co., The, Marion, O.
Thew Shovel Co., The, Lorain, O.
Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.

EXHAUST HEADS

Burt Mfg. Company, The, 400 S. High St., Akron 11, O.

EXHAUST SYSTEMS (Pickling Tank)

Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

FABRICATING (Metal)

Clinton Bridge Works, 101 S. Second St., Clinton, Iowa.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Gage Structural Steel Co., 3123-41 S. Hayne Ave., Chicago 8, Ill.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Midland Structural Steel Co., 1300-20 S. 54th Ave., Cicero 50, Ill.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Stanwood Corp., 4825 W. Cortland St., Chicago 39, Ill.
Warren City Mfg. Co., Warren, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

FABRICATORS (Structural)

Bedford Foundry & Mach. Co., Bedford, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Clinton Bridge Works, 101 S. Second St., Clinton, Iowa.
Danley Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.
Fort Pitt Bridge Works, Keystone Hotel Pittsburgh 22, Pa.
Gage Structural Steel Co., 3123-41 S. Hayne Ave., Chicago 8, Ill.
Guibert Steel Co., P.O. Box 1837, Pittsburgh 30, Pa.
Ingalls Iron Works Co., The, Birmingham 2, Ala.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Midland Structural Steel Co., 1300-20 S. 54th Ave., Cicero 50, Ill.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Warren City Mfg. Co., Warren, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

FACE SHIELDS

Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

FANS (Crane Cab)

American Blower Corp., 8111 Tireman Ave., Detroit 4, Mich.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Exhaust Ventilating)

American Blower Corp., 8111 Tireman Ave., Detroit 4, Mich.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

FANS (Mechanical Draft)

American Blower Corp., 8111 Tireman Ave., Detroit 4, Mich.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Despatch Oven Co., 619 Eighth St., S. E., Minneapolis 14, Minn.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

FANS (Portable)

Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Wall)

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FASTENERS (Locked In)

Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.

FEEDERS (Rotary)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.

FEEDS (Roll, Dial, Magazine)

Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Littell, F. J., Machine Co., 4165 N. Ravenswood Ave., Chicago 13, Ill.

FENCE (Chain Link)

Continental Steel Corp., Kokomo, Ind.
Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
Page Steel & Wire Div. American Chain & Cable Co., Inc., Monessen, Pa.

FENCE POSTS (Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.

FENCING (Wire)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco 6, Cal.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Keystone Steel & Wire Co., Peoria 7, Ill.
Page Steel & Wire Div. American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST., Cleveland 4, O.
Roebling's John A., Sons Co., Trenton 2, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.

FERROALLOY BRIQUETS

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro Alloys Corp., Citizens Bldg., Canton 2, O.

FERROALLOYS

Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland 14, O.
Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.

International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Keokuk Electro-Metals Co., Keokuk Ia
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Miller & Co., 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro Alloys Corp., Citizens Bldg., Canton 2, O.
Vanadium Corp., of America, 420 Lexington Ave., New York 17, N. Y.

FERROBORON

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro Alloys Corp., Citizens Bldg., Canton 2, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Ohio Ferro Alloys Corp., Citizens Bldg., Canton 2, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh 19, Pa.

FERROPHOSPHORUS

Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

FERROSILICON

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Keokuk Electro-Metals Co., Keokuk, Ia.
Miller & Co., 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro Alloys Corp., Citizens Bldg., Canton 2, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga 2, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

FERROSILICON ALUMINUM

Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

FERROTITANIUM

Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

FERROTUNGSTEN

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

FILES AND RASPS

Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Simmonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.

FILTER MEDIA

Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

FILTERS (Air)—See CLEANERS AND FILTERS (Air)

FILTERS (Acid)

Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

FILTERS (Air-Engine)

American Air Filter Co., Inc., 443 Central Ave., Louisville 8, Ky.

FILTERS (Oil)

Burt Mfg. Company, The, 400 S. High St., Akron 11, O.

FINISH, BLACK OXIDE (Chemicals for)

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.

FINISHING EQUIPMENT (Painting and Drying)

Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.

FIRE BRICK—See BRICK

FIRE BRICK (Insulating)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FIRE EXTINGUISHERS

Automatic Sprinkler Corp. of America, Brittain St., Youngstown 8, O.
Cardox Corp., Bell Bldg., Chicago 1, Ill.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.

FIRE EXTINGUISHING SYSTEMS

Automatic Sprinkler Corp. of America, Brittain St., Youngstown 8, O.
Cardox Corp., Bell Bldg., Chicago 1, Ill.

FITTINGS (Acid Proof)

Goodrich, B. F., Co., The, Akron 18, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

FITTINGS (Pipe Welding)

Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.

FLAME HARDENING

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
National Erie Corp., Erie, Pa.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

FLANGES (Cast Steel)

Pittsburgh Steel Foundry Corp., Glassport, Pa.

FLANGES (Forged Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Harrisburg Steel Corp., Harrisburg, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Ladish Co., Cudahy, Wis.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.

FLEXIBLE SHAFT MACHINERY

Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.

FLOORING (Monolithic)

Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

FLOORING (Steel)

Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh 1, Pa.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.

FLUE DUST CONDITIONERS

Brosius, Edgar E. Co., Sharpsburg P. O., Pittsburgh 15, Pa.

FLUORSPAR

Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

FLUXES (Brazing)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Dewey & Almy Chemical Co., Cambridge 40, Mass.
Handy & Harman, 82 Fulton St., New York 7, N. Y.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.

FLUXES (Soldering, Welding & Tinning)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Chemical Paint Co., Ambler, Pa.
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, 25, Pa.
Dewey & Almy Chemical Co., Cambridge 40, Mass.
Handy & Harman, 82 Fulton St., New York 7, N. Y.
Kester Solder Co., 4222 Wrightwood Ave., Chicago 39, Ill.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Metallizing Co. of America, 1330 W. Congress St., Chicago 7, Ill.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOIL (Electrical Condenser)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

FORGING DIES

Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.

FORGING MACHINERY

Alliance Machine Co., The, Alliance, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Paschall P. O., Philadelphia 42, Pa.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.

FORGINGS (Aluminum, Magnesium, Brass, Bronze, Copper)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Brass Co., The, Waterbury 88, Conn.
American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.
Wyman-Gordon Products Corp., Worcester 1, Mass.

FORGINGS (Drop) (*Also Stainless)

*Atlas Drop Forge Co., Lansing 2, Mich.
*Baldt Anchor, Chain & Forge Div. of The Boston Metals Co., Chester, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., Drop Forge Div., 426 Weakley St., Memphis 10, Tenn.
Davenport Besler Corp., Davenport, Iowa.
Frost Gear and Forge Div., Clark Equipment Co., Jackson, Mich.
Harrisburg Steel Corp., Harrisburg, Pa.
Jackson Drop Forge Co., Jackson, Mich.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Ladish Co., Cudahy, Wis.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.
Wyman-Gordon Products Corp., Worcester 1, Mass.

FORGINGS (Hollow Bored)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Atlas Drop Forge Co., Lansing 2, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Harrisburg Steel Corp., Harrisburg, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Wyman-Gordon Products Corp., Worcester 1, Mass.

FORGINGS (Iron and Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
*Atlas Drop Forge Co., Lansing 2, Mich.
*Baldt Anchor, Chain & Forge Div. of The Boston Metals Co., Chester, Pa.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Frost Gear and Forge Div., Clark Equipment Co., Jackson, Mich.
Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
Jackson Drop Forge Co., Jackson, Mich.
*Jessop Steel Co., 584 Green St., Washington, Pa.
*Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Ladish Co., Cudahy, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
*Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas 1, Tex.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Struthers Wells Corp., Titusville, Pa.
*Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.
Wyman-Gordon Products Corp., Worcester 1, Mass.

FORGINGS (Machined)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.

FORGINGS (Press)

Bethlehem Steel Co., Bethlehem, Pa.
Ladish Co., Cudahy, Wis.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.

FORGINGS (Small)

Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

FORGINGS (Upset)

American Metal Products Co., 5959 Linsdale Ave., Detroit 4, Mich.
Atlas Drop Forge Co., Lansing 2, Mich.
Baldt Anchor, Chain & Forge Div. of The Boston Metals Co., Chester, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Frost Gear and Forge Div., Clark Equipment Co., Jackson, Mich.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Ladish Co., Cudahy, Wis.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.
Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.
Wyman-Gordon Products Corp., Worcester 1, Mass.

FOUNDRY EQUIPMENT

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Pangborn Corporation, Hagerstown, Md.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati 16, O.
Robins Conveyors, Inc., Div. of Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Warren City Mfg. Co., Warren, O.

FRAMES (Automobile)

Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

FRAMES (Motor Truck, Trailer & Bus)

Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

FROGS AND SWITCHES

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

FURNACE EQUIPMENT (Water Cooled)

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.

FURNACE INSULATION—See INSULATION

FURNACES (Brazing)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Electric Furnace Co., The, Salem, O.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
General Electric Co., Schenectady 5, N. Y.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee 1, Wis.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

FURNACES (Controlled Atmosphere)

Electric Furnace Co., The, Salem, O.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

FURNACES (Electric Heating)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady 5, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee 1, Wis.
Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh 30, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

FURNACES (Electric Melting)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh 30, Pa.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.

FURNACES (Enameling)

Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady 5, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago 12, Ill.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

FURNACES (Forging)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Electric Furnace Co., The, Salem, O.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Lansing Engineering Co., 934-36 Clark St., Lansing 6, Mich.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
R-S Products Corp., Philadelphia 44, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.
Wilson, Lee, Engineering Co., Inc., 20005 Lake Rd., Cleveland 16, O.

FURNACES (Galvanizing)

Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
General Electric Co., Schenectady 5, N. Y.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Furnace Engineers, Inc., 1551 W. Liberty Ave., Pittsburgh 26, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

FURNACES (Gas Fired & Induction)

Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

FURNACES (Gas or Oil)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Electric Furnace Co., The, Salem, O.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Johnson Gas Appliance Co., 573 "E" Ave., N. W., Cedar Rapids, Iowa.
Lansing Engineering Co., 934-36 Clark St., Lansing 6, Mich.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
R-S Products Corp., Philadelphia 44, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Electric Furnace Co., The, Salem, O.
Furnace Engineers, Inc., 1551 W. Liberty Ave., Pittsburgh 26, Pa.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
General Electric Co., Schenectady 5, N. Y.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee 1, Wis.
Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Johnson Gas Appliance Co., 573 "E" Ave., N.W., Cedar Rapids, Iowa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.
Lansing Engineering Co., 934-36 Clark St., Lansing 6, Mich.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago 12, Ill.
R-S Products Corp., Philadelphia 44, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Engineering Co., Inc., 20005 Lake Rd., Cleveland 16, O.

FURNACES (Induction Melting)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.

FURNACES (Laboratory)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee 1, Wis.
Johnson Gas Appliance Co., 573 "E" Ave., N.W., Cedar Rapids, Iowa.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.

Salem Engineering Co., 714 S. Broadway, Salem, O.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

FURNACES (Open Hearth)

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

FURNACES (Portable)

Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

FURNACES (Recuperative)

Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

FURNACES (Rivet Heating)

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N.Y. 23, N.Y.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.

FURNACES (Sheet and Tin Mill)

Electric Furnace Co., The, Salem, O.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Wilson, Lee, Engineering Co., Inc., 20005 Lake Rd., Cleveland 16, O.

FURNACES (Sintering)

Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.

FURNACES (Steel Mill)

Electric Furnace Co., The, Salem, O.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.
Wilson, Lee, Engineering Co., Inc., 20005 Lake Rd., Cleveland 16, O.

FURNITURE (Welding)

Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh 8, Pa.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

FURNITURE (Shop)

Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
New Britain Machine Co., New Britain, Conn.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

GAGES

Brown & Sharpe Mfg. Co., Providence 1, R. I.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Kennametal, Inc., Latrobe, Pa.
Merz Engineering Co., Indianapolis 7, Ind.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.
Stewart-Warner Corp., Instrument Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

GAGES (Automatic Control & Recording)

Bristol Co., The, Waterbury 91, Conn.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.

GAGES (Electronic)

Jack & Heintz Precision Industries, Inc., Cleveland 1, O.

GAGES (Hard Faced)

Merz Engineering Co., Indianapolis 7, Ind.

GAGES (Indicating and Recording)

Bristol Co., The, Waterbury 91, Conn.
General Electric Co., Schenectady 5, N. Y.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.
Westinghouse Electric Corp., Orange Ave., Newark 1, N. J.

GAGES (Pressure & Vacuum Recording)

Bristol Co., The, Waterbury 91, Conn.

GAGES (Thread-Ring & Plug)

Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.
Merz Engineering Co., Indianapolis 7, Ind.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.

GALVANIZING BLANKET CRYSTALS

Dewey & Almy Chemical Co., Cambridge 40, Mass.

GALVANIZING (Hot Dip)

Acme Galvanizing, Inc., Milwaukee 7, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 1st National Bank Bldg., Pittsburgh 22, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Stamping Co., Rochester, N. Y.
Atlantic Steel Co., Atlanta, Ga.
Atlas Galvanizing Inc., Los Angeles, Calif.
Cattie, Jos. P., & Bros., Gaul and Letterly Sts., Philadelphia 25, Pa.
Columbian Steel Tank Co., Kansas City 7, Mo.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Emsco Derrick & Equipment Co., Los Angeles 54, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.
Equipment Steel Products Div. of Union Asbestos and Rubber Co., Blue Island, Ill.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco 7, Cal.
Galvanizers Incorporated, Portland, Ore.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh 1, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International Derrick & Equipment Co., Torrance, Calif.
International-Stacey Corp., Columbus 8, O.
Isaacson Iron Works, Seattle 14, Wash.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago 9, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Laughlin, Thomas, Co., Portland, Maine.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Los Angeles Galvanizing Co., Huntington Park, Calif.
Missouri Rolling Mill Corp., St. Louis 10, Mo.
National Telephone Supply Co., The, Cleveland 3, O.
Newark Galvanizing Co., The, Newark, O.
Penn Galvanizing Co., Philadelphia, Pa.
Rheem Mfg. Co., Richmond, Calif.
Rheem Research Products Inc., 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Southern Galvanizing Co., Baltimore 30, Md.
Standard Galvanizing Co., Chicago 18, Ill.
Superior Pacific Galvanizing Co., Los Angeles, Calif.
Western Galvanizing Co., Los Angeles 23, Calif.
Wilcox Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati 14, O.

GALVANIZING EQUIPMENT (Electro)

Hanson-Van Winkle-Munning Co., Matawan, N. J.

GALVANIZING PLANTS FOR SHEETS

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Inc., The, Warren, O.

GALVANIZING POWDER

American Solder & Flux Co., 2153 E. Norris St., Philadelphia 25, Pa.

GALVANIZING PRODUCTS

Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.

GAS HOLDERS

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Bethlehem Steel Co., Bethlehem, Pa.

GAS MASKS

Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

GAS PRODUCER PLANTS

Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Morgan Construction Co., Worcester 5, Mass.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.

GAS RECOVERY COKE OVENS AND GAS PLANTS

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

GAS SCRUBBERS AND WASHERS

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

GASKETS (Asbestos, Metal or Rubber)

Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
National Lead Co., 111 Broadway, New York 6, N. Y.
Steel Improvement & Forge Co., The, 942 E. 64th St., Cleveland 14, O.

GATES (Iron & Steel)

Bethlehem Steel Co., Bethlehem, Pa.

GEAR BLANKS

Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Bethlehem Steel Co., Bethlehem, Pa
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foote Bros. Gear & Machine Co., 5225 S. Western Blvd., Chicago 9, Ill.
Frost Gear and Forge Div., Clark Equipment Co., Jackson, Mich.
Jackson Drop Forge Co., Jackson, Mich.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Ladish Co., Cudahy, Wis.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
National Erie Corp., Erie, Pa.
Ottumwa Iron Works, Ottumwa, Ia.
Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Union Steel Castings Div., Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh 1, Pa.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.
U. S. Automatic Corp., Amherst, O.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)

Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)

Farrel-Birmingham Co., Inc., Ansonia, Conn.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.

GEARS (Nonmetallic)

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago 22, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote, Brad, Gear Works, 1309 S. Cicero Ave., Cicero 50, Ill.
General Electric Co., Schenectady 5, N. Y.
Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh 22, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh 22, Pa.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

GEARS (Steel Laminated)

Industrial Gear Mfg. Co., 4545 W Van Buren St, Chicago 24, Ill.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh 22, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)

Cleveland Worm & Gear Co., The, 3270 E. 80th St., Cleveland 4, O.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Fairfield Manufacturing Co., 303 S. Earle Ave., Lafayette, Ind.
Foote Bros. Gear & Machine Co., 5225 S. Western Blvd., Chicago 9, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.
Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh 22, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh 22, Pa.
Steel Products Engineering Co., The, 1205 W Columbia St., Springfield, O.

GEARS AND GEAR CUTTING

Barber-Colman Co., 150 Loomis St., Rockford, Ill.
Cleveland Worm & Gear Co., The, 3270 E. 80th St., Cleveland 4, O.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Dodge Manufacturing Co., Mishawaka, Ind.
Fairfield Manufacturing Co., 303 S. Earl Ave., Lafayette, Ind.
Falk Corporation, The, Milwaukee 8, Wis.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote, Brad, Gear Works, 1309 S. Cicero Ave., Cicero 50, Ill.
Foote Bros. Gear & Machine Co., 5225 S. Western Blvd., Chicago 9, Ill.
Frost Gear and Forge Div., Clark Equipment Co., Jackson, Mich.
General Electric Co., Schenectady 5, N. Y.
Grant Gear Works, 2nd & B Sts., Boston 27, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.
Illinois Gear & Machine Co., 2108 N. Natchez Ave., Chicago 35, Ill.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago 24, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh 3, Pa.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
National Erie Corp., Erie, Pa.
National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.
Ottumwa Iron Works, Ottumwa, Ia.
Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh 22, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh 22, Pa.
Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.
Warren City Mfg. Co., Warren, O.
Westinghouse Electric Corp., 200 McCandless Ave., Pittsburgh 1, Pa.

GENERATING SETS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Century Electric Co., 1806 Pine St., St. Louis 3, Mo.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
DeLaval Steam Turbine Co., Trenton 2, N. J.
General Electric Co., Schenectady 5, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Master Electric Co., The, 100 Davis Ave., Dayton 1, O.
Ready-Power Co., The, 3824 Grand River Ave., Detroit 8, Mich.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland 10, O.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)

Linde Air Products Co., The, 30 E. 42nd St., New York 7, N. Y.

GENERATORS (Electric)

Allis-chalmers Mfg. Co., Milwaukee 1, Wis.
Century Electric Co., 1806 Pine St., St. Louis 3, Mo.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Lincoln Electric Co., The, Cleveland 1, O.
Master Electric Co., The, 100 Davis Ave., Dayton 1, O.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland 10, O.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Inert Gas)

Roots-Connersville Blower Corp., Connersville, Ind.

GENERATORS (Plating)

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.

GLUE (Glue & Abrasive Mixed)

Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.

GLUE (Liquid Cold)

Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.

GOGGLES (Safety)

Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

GRABS—FOR SHEETS, COILS, INGOTS

Mansaver Industries Inc., 3101 East St., New Haven 3, Conn.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

GRAPHITE

International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

GRAPPLES

Blaw-Knox Div. of Blaw-Knox Co., Blawknox, Pa.
General Excavator Co., The, Marion, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Osgood Co., The, Marion, O.
Owen Bucket Co., 6013 Breakwater Ave., Cleveland 2, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

GRATING

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh 1, Pa.

GREASE (Lubricating)—See Lubricants (Industrial)

GREASE SEALS

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago 22, Ill.
Gits Brothers Mfg. Co., 1836 S. Kilbourn Ave., Chicago 23, Ill.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

GRILLS (Perforated Metal)

Diamond Mfg. Co., Wyoming, Pa.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.

GRINDER ATTACHMENTS

Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Cincinnati Grinders, Incorporated, Cincinnati 9, O.
Fitchburg Grinding Machine Corp., Fitchburgh, Mass.
Landis Machine Co., Waynesboro, Pa.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester 6, Mass.

GRINDER CENTERS

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kennametal, Inc., Latrobe, Pa.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

GRINDER HEADS

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDERS (Automotive Reconditioning)

Heald Machine Co., The, Worcester 6, Mass.
Landis Tool Co., Waynesboro, Pa.

GRINDERS (Bench & Floor Type)

Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Brown-Brockmeyer Co., The, P.O. Box 976, Dayton 1, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.

GRINDERS (Broach)

Colonial Broach Co., P. O. Box 87, Harper Sta., Detroit 13, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.

GRINDERS (Carbide Tool)

Brown-Brockmeyer Co., The, P.O. Box 976, Dayton 1, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

GRINDERS (Centerless—Internal and External)

Cincinnati Grinders, Incorporated, Cincinnati 9, O.
Heald Machine Co., The, Worcester 6, Mass.
Landis Tool Co., Waynesboro, Pa.

GRINDERS (Chucking)

Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Heald Machine Co., The, Worcester 6, Mass.
Landis Tool Co., Waynesboro, Pa.

GRINDERS (Circular Saw)

Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, O.

GRINDERS (Crank Pin, Cam, Piston, Valve Face)

Cincinnati Grinders, Incorporated, Cincinnati 9, O.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester 6, Mass.

GRINDERS (Cylindrical)

Brown & Sharpe Mfg. Co., Providence 1, R. I.
Cincinnati Grinders, Incorporated, Cincinnati 9, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester 6, Mass.

GRINDERS (Die)

Blanchard Machine Co., The, 64 State St., Cambridge, 39, Mass.
Bridgeport Safety Emery Wheel Co. Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Landis Machine Co., Waynesboro, Pa.
Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.

GRINDERS (Plain and Universal)

Brown & Sharpe Mfg. Co., Providence 1, R. I.
Cincinnati Grinders, Inc., Cincinnati 9, O.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Machine Tool Co., The, Cincinnati 8, O.
Norton Co., Worcester 6, Mass.

GRINDERS (Portable)

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway New York 4, N. Y.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

GRINDERS (Precision Thread)

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
Landis Tool Co., Waynesboro, Pa.

GRINDERS (Roll)

Farrel-Birmingham Co., Inc., Ansonia, Conn.
Landis Tool Co., Waynesboro, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Norton Co., Worcester 6, Mass.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

GRINDERS (Shear Knife)

Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Mattison Machine Works, Rockford, Ill.
Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.

GRINDERS (Sheet Steel & Internal Tube)

Mattison Machine Works, Rockford, Ill.

GRINDERS (Single Slide Internal)

Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.

GRINDERS (Spline)

Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.

GRINDERS (Surface)

Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Bridgeport Safety Emery Wheel Co. Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Foote-Burt Co., The, Cleveland 8, O.
Heald Machine Co., The, Worcester 6, Mass.
Mattison Machine Works, Rockford, Ill.
Reid Brothers Co., Inc., 140 Elliott St., Beverly, Mass.
Norton Co., Worcester 6, Mass.
Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.

GRINDERS (Tool and Cutter)

Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Brown-Brockmeyer Co., The, P.O. Box 976, Dayton, O.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Cincinnati Milling Machine Co., Cincinnati 9, O.
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Machine Tool Co., The, Cincinnati 8, O.
Norton Co., Worcester 6, Mass.
Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.

GRINDERS AND BUFFERS

Brown-Brockmeyer Co., The, P.O. Box 976, Dayton 1, O.

GRINDING (Shear Knife)

American Shear Knife Co., P. O. Box 355, Homestead, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.

GRINDING (Surface)

Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.

GRINDING MACHINES (Gear)

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING—PRECISION (Contract)

Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.

GRINDING WHEELS

Bay State Abrasive Products Co., Union St., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Carborundum Co., The, Niagara Falls, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Keystone Abrasive Wheel Inc., Carnegie, Pa.
Norton Co., Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, Mich.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel, The, Div., of The Cleveland Quarries Co., Tiffin, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

GRINDING WHEELS (Mounted)

Bay State Abrasive Products Co., Union St., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Keystone Abrasive Wheel Inc., Carnegie, Pa.
Norton Co., Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, Mich.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

GRINDING WHEELS (Segmental)

Bay State Abrasive Products Co., Union St., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.
Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, Mich.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel, The, Div., of The Cleveland Quarries Co., Tiffin, O.

GUIDES (Mill)

Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
National Erie Corp., Erie, Pa.

GUIDES (Valve)

Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.

GUNS (Blast Furnace Mud)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Brosius, Edgar E., Co. Inc., Sharpsburg P. O., Pittsburgh 15, Pa.

GUNS (Steam, Hydraulic, Electric)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Brosius, Edgar E., Co. Inc., Sharpsburg P. O., Pittsburgh 15, Pa.

HAMMER BOARDS

Irwin Mfg. Co., Inc., Garland, Pa.

HAMMERS (Drop)

Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.

HAMMERS (Pneumatic)

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

HAMMERS (Power)

Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

HAMMERS (Steam)

Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS

Bantam Bearings Div., The Torrington Co., South Bend 21, Ind.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
Power Piping Div. of Blaw-Knox Co., Beaver & Western Ave., Pittsburgh 2, Pa.
SKF Industries, Inc., Philadelphia 32, Pa.

HAULAGE SYSTEMS

Dempster Brothers, Inc., Knoxville 17, Tenn.

HEADING MACHINERY

National Machinery Co., The, Tiffin, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.

HEADS (Tank)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Worth Steel Co., Claymont, Del.

HEAT EXCHANGERS

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y.
Ross Heater & Mfg. Co., Inc., 1431 West Ave., Buffalo 13, N. Y.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.
Stewart-Warner Corp., Heater Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.
Struthers Wells Corp., Titusville, Pa.

HEAT TREATING and HARDENING

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Pittsburgh Commercial Heat Treating Co., 49th St. & A.V.R.R., Pittsburgh 1, Pa.

HEAT TREATING MATERIALS

duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.

HEATERS (Air)

American Blower Corp., 8111 Tireman Ave., Detroit 4, Mich.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.

HEATERS (Instantaneous)

Ross Heater & Mfg. Co., Inc., 1431 West Ave., Buffalo 13, N. Y.

HEATERS (Unit)

American Blower Corp., 8111 Tireman Ave., Detroit 4, Mich.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Stewart-Warner Corp., Heater Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Westinghouse Electric Corp., Mansfield, O.

HELMETS (Blast Cleaning)

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.
Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

HELMETS (Welding)

Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

HINGES AND BUTTS

Veeder-Root, Inc., Hartford 2, Conn.

HITCHINGS (Mine Car)

American Chain & Cable Co., Inc., Bridgeport 2, Conn.

HOBBING MACHINES

Barber-Colman Co., 150 Loomis St., Rockford, Ill.

HOB CHECKING MACHINES

Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

HOBS

Barber-Colman Co., 150 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.

HOIST (Chain)

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp., 118 Fremont St., Tonawanda, N. Y.
Cleveland Tramrail Div., of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div., American Chain & Cable Co., Inc., 2nd & Diamond St., Philadelphia 22, Pa.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

HOISTS (Diesel, Gasoline, Steam)

American Hoist & Derrick Co., St. Paul 1, Minn.

HOISTS (Electric)

American Hoist & Derrick Co., St. Paul 1, Minn.
American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Browning, Victor R., Co., Inc., Willoughby, O.
Chisholm-Moore Hoist Corp., 118 Fremont St., Tonawanda, N. Y.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

HOISTS (Electric) (Cont'd.)

Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.

HOISTS (Monorail)

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp., 118 Fremont St., Tonawanda, N. Y.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1865 Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

HOISTS (Pneumtic)

Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis 20, Mo.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee 7, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

HOISTS (Truck Body)

Dempster Brothers, Inc., Knoxville 17, Tenn.

HONING MACHINES

Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4, Mich.
Moline Tool Co., 102 20th St., Moline, Ill.

HOOKS (Chain)

American Chain Div. American Chain & Cable Co., Inc., York, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

HOOPS (Welded Wire)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Keystone Steel & Wire Co., Peoria 7, Ill.

HOOPS—See BANDS AND HOOPS (Iron and Steel)

HOPPERS (Motorized)

Detroit Power Screwdriver Co., 2813 W. Fort St., Detroit 16, Mich.

HOSE (Flexible Metal)

Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.
National-Standard Co., Niles, Mich.
Penflex Sales Co., Div. of Pennsylvania Flexible Metallic Tubing Co., 7250 Powers Lane, Philadelphia 42, Pa.

HOSE (Flexible Nonmetallic)

Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.

HOSE (Rubber)

Boston Woven Hose & Rubber Co., P.O. Box 1071, Boston 3, Mass.
Gates Rubber Co., The, 999 S. Broadway, Denver 17, Colo.
Goodrich, B. F., Co., The, Akron 18, O.
Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

HOSE CLAMPS, FITTINGS, NIPPLES AND MENDERS

Boston Woven Hose & Rubber Co., P.O. Box 1071, Boston 3, Mass.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

HYDRAULIC MACHINERY

Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Alliance Machine Co., The, Alliance, O.
Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Chambersburg Engineering Co., Chambersburg, Pa.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Morgan Engineering Co., The, Alliance, O.
National Erie Corp., Erie, Pa.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS

Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Sundstrand Machine Tool Co. 2540 Eleventh St., Rockford, Ill.
Weinman Pump & Supply Co., The, 207-209 Boulevard of the Allies, Pittsburgh 22, Pa.

INDICATORS (Blast Furnace Stock Line)

Bristol Co., The, Waterbury 91, Conn.
Brosius, Edgar E., Co., Sharpsburg P.O., Pittsburgh 15, Pa.

INDICATORS (Electronic)

Jack & Heintz Precision Industries, Inc., Cleveland 1, O.

INDICATORS (Temperature)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Bristol Co., The, Waterbury 91, Conn.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Stewart-Warner Corp., Instrument Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.
Westinghouse Electric Corp., Orange Ave., Newark 1, N. J.

INDUCTION BRAZING and SOLDERING EQUIPMENT

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Johnson Gas Appliance Co., 573 "E" Ave., N.W., Cedar Rapids, Iowa.
Lepel High Frequency Laboratories, Inc., 39 W. 60 St., New York 23, N. Y.
Ohio Crankshaft Co., The, 3800 Harvard Ave., Cleveland 1, O.

INDUCTION HARDENING

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Pittsburgh Commercial Heat Treating Co., 49th St. & A.V.R.R., Pittsburgh 1, Pa.

INDUCTION HEATING and HARDENING EQUIPMENT

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Lepel High Frequency Laboratories, Inc., 39 W. 60 St., New York 23, N. Y.
Ohio Crankshaft Co., The, 3800 Harvard Ave., Cleveland 1, O.
Westinghouse Electric Corp., Baltimore 3, Md.

INDUCTION MELTING EQUIPMENT

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.

INFRA-RED EQUIPMENT (Baking, Drying, Dehydrating, Preheating)

Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.
Trumbull Electric Mfg. Co., The, Plainville, Conn.

INGOT MOLD WASH (GRAPHITE)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.

INGOT MOLDS

Bethlehem Steel Co., Bethlehem, Pa.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh 22, Pa.
Valley Mould & Iron Co., Hubbard, O.

INHIBITORS

American Chemical Paint Co., Ambler, Pa.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

INSPECTING TOOLS

Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.
Surface Checking Gage Co., 1937 Taft Ave., Hollywood 28, Cal.

INSPECTION EQUIPMENT

Sheffield Corp., The, 721 Springfield St., Dayton 1, O.

INSTRUMENTS (Counting)

Veeder-Root, Inc., Hartford 2, Conn.

INSTRUMENTS (Electric-Indicating and Recording)

Bristol Co., The, Waterbury 91, Conn.
Brush Development Co., The, 3405 Perkins Ave., Cleveland 14, O.
General Electric Co., Schenectady 5, N. Y.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK OR BRICK

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

INSULATING CONCRETE

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
Lumnite Div. Universal Atlas Cement Co., Dept. S, Chrysler Bldg. New York 17, N. Y.

INSULATING POWDER AND CEMENT

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

INSULATION (Building)

Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

IRON ORE

Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland 14, O.
Pickands Mather & Co., Union Commerce Bldg., Cleveland 14, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh 22, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh 22, Pa.

JETS (Steam)

Heil Process Equipment Co., 12903 Elmwood Ave., Cleveland 11, O.

JIG BORERS

Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago 6, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.
Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.

JOINTS (Universal)

Lovejoy Flexible Coupling Co., 5071 W. Lake St., Chicago 44, Ill.

KETTLES (Galvanizing)

National Annealing Box Co., Washington, Pa.

KEYS (Machine or Woodruff)

Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES

American Shear Knife Co., P.O. Box 355, Homestead, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland 2, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.

LABORATORY EQUIPMENT

Precision Scientific Co., 3737 Cortland St., Chicago 47, Ill.

LABORATORY WARE

Bay State Abrasive Products Co., Union St., Westboro, Mass.
Norton Company, Worcester 6, Mass.

LADLES

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.

LAMP GUARDS

McGill Mfg. Co., Inc., Valparaiso, Ind.

LAPPING (Diamond Abrasive)

Kondor Products Corp., West Clifton Blvd. at Sloane, Cleveland 7, O.

LAPPING MACHINES

Cincinnati Grinders, Incorporated, Cincinnati 9, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
National Broach & Machine Co., 5600 St. Jean Ave., Detroit 18, Mich.
Norton Company, Worcester 6, Mass.

LARRIES (Coal)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Differential Steel Car Co., Findlay, O.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Wellman Engineering Co., The 7000 Central Ave., Cleveland 4, O.

LATHE ATTACHMENTS

Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
LeBlond, R. K., Machine Tool Co., The, Cincinnati 8, O.
Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.
Monarch Machine Tool Co., The, Sidney, O.
South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

LATHE CENTERS

Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kennametal, Inc., Latrobe, Pa.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

LATHE DOGS (Drop Forged)

South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

LATHE TOOLS (Carbide Tipped)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Kennametal, Inc., Latrobe, Pa.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

LATHES (Automatic)

Brown & Sharpe Mfg. Co., Providence 1, R. I.
Bullard Co., The, Bridgeport 2, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., The, Cincinnati 8, O.
Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.
Monarch Machine Tool Co., The, Sidney, O.
Potter & Johnston Machine Co., 1027 Newport Ave., Pawtucket, R. I.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.
Wickes Brothers, Saginaw, Mich.

LATHES (Automatic Chucking)

Potter & Johnston Machine Co., 1027 Newport Ave., Pawtucket, R. I.

LATHES (Automatic Turret)

Potter & Johnston Machine Co., 1027 Newport Ave., Pawtucket, R. I.

LATHES (Buffing & Polishing)

Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.

LATHES (Chucking)

Bullard Co., The, Bridgeport 2, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.
Potter & Johnston Machine Co., 1027 Newport Ave., Pawtucket, R. I.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

LATHES (Crankshaft)

LeBlond, R. K., Machine Tool Co., The, Cincinnati 8, O.
Wickes Brothers, Saginaw, Mich.

LATHES (Double End)

Wickes Brothers, Saginaw, Mich.

LATHES (Engine)

LeBlond, R. K., Machine Tool Co., The, Cincinnati 8, O.
Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.
Monarch Machine Tool Co., The, Sidney, O.
South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.
Wickes Brothers, Saginaw, Mich.

LATHES (Gap)

LeBlond, R. K., Machine Tool Co., Cincinnati 8, O.
Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.

LATHES (Gun)

LeBlond, R. K. Machine Tool Co., The, Cincinnati 8, O.
Wickes Brothers, Saginaw, Mich.

LATHES (Hollow Spindle or Oil Country)

LeBlond, R. K., Machine Tool Co., Cincinnati 8, O.
Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.

LATHES (Manufacturing)

Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.
LeBlond, R. K., Machine Tool Co., Cincinnati 8, O.
Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.
Monarch Machine Tool Co., The, Sidney, O.
South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.

LATHES (Roll Turning)

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh 3, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

LATHES (Tool Room)

LeBlond, R. K. Machine Tool Co., Cincinnati 8, O.
Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.
Monarch Machine Tool Co., The, Sidney, O.

LATHES (Turret)

Brown & Sharpe Mfg. Co., Providence 1, R. I.
Bullard Company, The, Bridgeport 2, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Potter & Johnston Machine Co., 1027 Newport Ave., Pawtucket, R. I.
South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

LATHES (Turret, Vertical)

Bullard Co., The, Bridgeport 2, Conn.

LEAD (Pigs)

Anaconda Sales Co., 25 Broadway, New York 4, N. Y.

LEAD (Red, White, Litharge)

National Lead Co., 111 Broadway, New York 6, N. Y.

LEAD (Sheets, Pipe, etc.)

National Lead Co., 111 Broadway, New York 6, N. Y.

LEAD (Tellurium)

National Lead Co., 111 Broadway, New York 6, N. Y.

LEVELING MACHINES

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
McKay Machine Co., The 546 W. Rayen St., Youngstown 2, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Paxson Machine Co., Benton Rd., Salem, O.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIFTS (Monorail)

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

LIGHTING (Fluorescent Equipment)

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., 1216 W. 58th St., Cleveland 1, O.

LIGHTING (Industrial)

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Westinghouse Electric Corp., 1216 W. 58th St., Cleveland 1, O.

LIME (Chemical and Fluxing)

Baker, The J. E., Co., 114 N. George St., York, Pa.

LIMESTONE (Open Hearth & Blast Furnace)

Baker, The J. E., Co., 114 N. George St., York, Pa.
Basic Refractories, Inc., Hanna Bldg., Cleveland 15, O.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.

LINERS (Mill)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Taylor-Wharton Iron & Steel Co., Easton, Pa.

LINERS (Pump and Cylinder)

Harrisburg Steel Corp., Harrisburg, Pa.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Davenport Besler Corp., Davenport, Iowa.
Differential Steel Car Co., Findlay, O.
Fate-Root-Heath Co., Plymouth, O.
Plymouth Locomotive Works, Plymouth, O.
Porter, H. K., Company, Inc., 49th & Harrison Sts., Pittsburgh 1, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel-Mechanical)

Fate-Root-Heath Co., Plymouth, O.
Plymouth Locomotive Works, Plymouth, O.
Porter, H. K., Company, Inc., 49th & Harrison Sts., Pittsburgh 1, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)

Davenport Besler Corp., Davenport, Iowa.
Porter, H. K., Company, Inc., 49th & Harrison Sts., Pittsburgh 1, Pa.

LOCOMOTIVES (Electric Trolley)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady 5, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)

Porter, H. K., Company, Inc., 49th & Harrison Sts., Pittsburgh 1, Pa.

LOCOMOTIVES (Gasoline-Electric)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Davenport Besler Corp., Davenport, Iowa.
Differential Steel Car Co., Findlay, O.
Fate-Root-Heath Co., Plymouth, O.
General Electric Co., Schenectady 5, N. Y.
Plymouth Locomotive Works, Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline—Mechanical)

Davenport Besler Corp., Davenport, Iowa.
Differential Steel Car Co., Findlay, O.
Fate-Root-Heath Co., Plymouth, O.
Plymouth Locomotive Works, Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Differential Steel Car Co., Findlay, O.

LOCOMOTIVES (Steam)

Davenport Besler Corp., Davenport, Iowa.
Porter, H. K., Company, Inc., 49th & Harrison Sts., Pittsburgh 1, Pa.

LOCOMOTIVES (Storage Battery)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
General Electric Co., Schenectady 5, N. Y.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOUVERS

Burt Mfg. Company, The, 400 S. High St., Akron 11, O.

LUBRICANTS (Drawing)

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.

LUBRICANTS (Drawing) (Cont'd.)

Kondor Products Corp., West Clifton Blvd. at Sloan, Cleveland 7, O.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York 17, N. Y.
Penola, Inc., 221 North La Salle St., Chicago 1, Ill.

LUBRICANTS (Industrial)

Brooks Oil Co., 315 E. Carson St., Pittsburgh 19, Pa.
Cities Service Oil Company, 60 Wall Tower, New York 5, N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.
Kondor Products Corp., West Clifton Blvd. at Sloane, Cleveland 7, O.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York 17, N. Y.
Penola, Inc., 221 North LaSalle St., Chicago 1, Ill.
Sinclair Refining Co., 630 Fifth Ave., New York 20, N. Y.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York 4, N. Y.
Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.
Stuart D. A., Oil Co., Ltd., 2735½ S. Troy St., Chicago 23, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia 3, Pa.
Texas Co., The, 135 East 42nd St., New York 17, N. Y.
Tide Water Associated Oil Co., 17 Battery Place, New York 4, N. Y.

LUBRICATING DEVICES

Blaw-Knox Lubricators Div., Blawknox, Pa.
Farval Corp., The, 3270 E. 80th St., Cleveland 4, O.
Gits Brothers Mfg. Co., 1836 S. Kilbourn Ave., Chicago 23, Ill.
Stewart-Warner Corp., 1828 W. Diversey Pkwy., Chicago 14, Ill.

LUBRICATING SYSTEMS

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Farval Corp., The, 3270 E. 80th St., Cleveland 4, O.
Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

LUGS (Terminal)

Calumet & Hecla Consolidated Copper Co., Wolverine Tube Div., 1439 Central Ave., Detroit 9, Mich.

MACHINE WORK

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Avondale Marine Ways, Inc., Westwego, La.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Federal Shipbuilding & Dry Dock Co., Kearny, N. J.
General Engineering & Mfg. Co., 1523 S. 10th St., St. Louis 4, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, New York.
Morgan Engineering Co., The, Alliance, O.
National Roll & Machine Co., 954 Ansel Rd., Cleveland 3, O.
Ottumwa Iron Works, Ottumwa, Ia.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.
Thomas Machine Mfg. Co., Etna Branch, P. O., Pittsburgh 23, Pa.
Warren City Mfg. Co., Warren, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

MACHINERY (Automatic Transfer Processing)

Foote-Burt Co., The, Cleveland 8, O.
Greenlee Bros. & Co., 1927 Mason Ave., Rockford, Ill.

MACHINERY (Die-Casting)

Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Lester-Phoenix, Inc., 2629 Church Ave., Cleveland 13, O.
Wickes Brothers, Saginaw, Mich.

MACHINERY (Flexible Shaft)—See FLEXIBLE SHAFT MACHINERY

MACHINERY (Lithographing)

Wagner Litho Machinery Co., Hoboken, N. J.

MACHINERY (Plastic Molding)

Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Lester-Phoenix, Inc., 2629 Church Ave., Cleveland 13, O.

MACHINERY (Special)

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Alliance Machine Co., The, Alliance, O.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Atlas Tool & Designing Co., Castor & Kensington Aves., Philadelphia 24, Pa.
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Baldwin Southwark Div., Baldwin Locomotive Works, The, Pascall P. O., Philadelphia 42, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Brosius, Edgar E., Co., Inc., Sharpsburg P. O., Pittsburgh 15, Pa.
Cleveland Automatic Machine Co., The, 2269 Ashland Rd., Cleveland 3, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote Bros. Gear & Machine Co., 5225 S. Western Blvd., Chicago 9, Ill.
Foote-Burt Co., The, Cleveland 8, O.
General Engineering & Mfg. Co., 1523 S. 10th St., St. Louis 4, Mo.
Greenlee Bros. & Co., 1927 Mason Ave., Rockford, Ill.
Guibert Steel Co., P.O. Box 1837, Pittsburgh 30, Pa.
Hallden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Moline Tool Co., 102 20th St., Moline, Ill.
Morgan Engineering Co., The, Alliance, O.
National Automatic Tool Co. Inc., S. 7th & N Sts., Richmond, Ind.
National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.
National Erie Corp., Erie, Pa.
National Roll & Machine Co., 954 Ansel Rd., Cleveland 3, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Oil Well Supply Co., Dallas 1, Texas.
Paxson Machine Co., Benton Rd., Salem, O.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.
Shuster, F. B., Mfg. Co., Inc., The, New Haven 9, Conn.
Steel Products Engineering Co., 1205 W. Columbia St., Springfield, O.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee 14, Wis.
Struthers Wells Corp., Titusville, Pa.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.
Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh 22, Pa.
U. S. Automatic Corp., Amherst, O.
Wagner Litho Machinery Co., Hoboken, N. J.
Warren City Mfg. Co., Warren, O.
Wean Engineering Co., Inc., The, Warren, O.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

MACHINERY (Used & Rebuilt)

Albert, L. & Son, Whitehead Rd., Trenton, N. J.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago 3, Ill.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh 22, Pa.

MACHINERY (Vending)

Gerding Bros., 5 E. Third St., Cincinnati 2, O.

MACHINERY (Welding Wire)

Shuster, F. B., Mfg. Co., Inc., The, New Haven 9, Conn.

MACHINES (Marking)

Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

MACHINES (Photocopying)

Ozalid Products Div., General Aniline & Film Corp., Johnson City, N. Y.
Wickes Brothers, Saginaw, Mich.

MAGNESIA (Electrically Fused)

Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Norton Co., Worcester 6, Mass.

MAGNESIA-REFRACTORIES—See REFRACTORIES (Magnesia)

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETOS

Jack & Heintz Precision Industries, Inc., Cleveland 1, O.

MAGNETS (Lifting)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland 4, O.
Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.

MAGNETS (Separating)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland 4, O.

MANDRELS

Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.

MANGANESE METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Taylor-Wharton Iron & Steel Co., Easton, Pa.

MANGANESE ORE

Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

MANIFOLDS (Cylinder)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.

MANIPULATORS

Alliance Machine Co., The, Alliance, O.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Brosius, Edgar E., Co., Inc., Sharpsburg P. O., Pittsburgh 15, Pa.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.
Mesta Machine Co., P. O. Box 1466 Pittsburgh 30, Pa.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

MARKING DEVICES

American Crayon Co., Sandusky, O.
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh 19, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL CLEANERS

American Chemical Paint Co., Ambler, Pa.
Detrex Corporation, Detroit 32, Mich.
duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Holden, A. F., Co., The, P.O. Box 1898, New Haven 8, Conn.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.
Kondor Products Corp., West Clifton Blvd. at Sloan, Cleveland 7, O.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia 7, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.

METAL CLEANING MACHINES

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Bullard Co., The, Bridgeport 2, Conn.
Detrex Corporation, Detroit 32, Mich.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Pangborn Corporation, Hagerstown, Md.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati 16, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.

METAL DUPLICATION (Without Dies)

O'Neil-Irwin Mfg. Co., 304 8th Ave., So., Lake City 15, Minn.

METAL FINISHES

American Chemical Paint Co., Ambler, Pa.
Sturgis Products Co., Sturgis, Mich.

METAL POWDERS—See POWDERS, (Metal)

METAL SPRAYING EQUIPMENT AND SUPPLIES

Metallizing Co. of America, 1830 W. Congress St., Chicago 7, Ill.

METAL WASHING EQUIPMENT

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Detrex Corp., Detroit 32, Mich.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.

METALS (Nonferrous)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Brass Co., The, Waterbury 88, Conn.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit 26, Mich.
Bridgeport Brass Co., Bridgeport, Conn.
Bunting Brass & Bronze Co., The, Toledo 9, O.
Cadman, A. W. Mfg. Co., 28th & Smallman Sts., Pittsburgh 22, Pa.
Copperweld Steel Co., Warren, O.
Handy & Harman, 82 Fulton St., New York 7, N. Y.
Harper, The, H. M. Co., 2646 Fletcher St., Chicago 18, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
New Jersey Zinc Co., The, 160 Front St., New York 7, N. Y.
Revere Copper & Brass Inc., 230 Park Ave., New York 17, N. Y.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Riverside Metal Co., The, Riverside, N. J.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

METALS (Nonferrous—Corrosion & Abrasive Resistant)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

METALS (Silver Clad)

Handy & Harman, 82 Fulton St., New York 7, N. Y.

METERS (Gas)

Roots-Connersville Blower Corp., Connersville, Ind.

MICROMETERS

Brown & Sharpe Mfg. Co., Providence 1, R. I.

MILLING CUTTERS

Barber-Colman Co., 150 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Carbolov Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Cowles Tool Co., 2086 W. 110th St., Cleveland 2, O.
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Kennametal, Inc., Latrobe, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

MILLING CUTTERS (Carbide Tipped)

Continental Tool Works Div. of Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Cowles Tool Co., 2086 W. 110th St., Cleveland 2, O.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kennametal, Inc., Latrobe, Pa.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Tungsten Carbide Tool Co., Div. of Michigan Tool Co., Detroit, Mich.

MILLING MACHINE ATTACHMENTS

Brown & Shrarpe Mfg. Co., Providence 1, R. I.
Cincinnati Milling Machine Co., Cincinnati 9, O.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

MILLING MACHINES

Brown & Sharpe Mfg. Co., Providence 1, R. I.
Cincinnati Milling Machine Co., Cincinnati 9, O.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Moline Tool Co., 102 20th St., Moline, Ill.
National Broach & Machine Co., 5600 St. Jean Ave., Detroit 18, Mich.
Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.
Stokermat Corp., 4545 W. Mitchell St., Milwaukee 14, Wis.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.

MILLING MACHINES (Milling and Centering Combined)

Jones & Lamson Machine Co., Springfield, Vt.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MIXERS (Hot Metal)

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.

MIXING EQUIPMENT

Porter, H. K., Company, Inc., 49th & Harrison Sts., Pittsburgh 1, Pa.

MOLD PLUGS

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.

MOLDING MACHINES

Eaton Manufacturing Co., Foundry Div., 9771 French Rd., Detroit 13, Mich.

MOLDS (Ingots)—See INGOT MOLDS

MOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh 19, Pa.

MONEL METAL (All Commercial Forms)

International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.

MONORAIL SYSTEMS

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTION PICTURE EQUIPMENT

Eastman Kodak Co., 343 State St., Rochester 4, N. Y.

MOTOR CONTROLS

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Brown-Brockmeyer Co., The, P.O. Box 976, Dayton 1, O.
Century Electric Co., 1806 Pine St., St. Louis 3, Mo.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Lincoln Electric Co., The, Cleveland 1, O.
Master Electric Co., The, 100 Davis Ave., Dayton 1, O.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland 10, O.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.
Wesche, B. A., Electric Co., The, 1628 Vine St., Cincinnati 10, O.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

MOTORS (Gasoline)

Propulsion Engine Corp., 7th & White Eagle Rd., Kansas City, Kans.

MOTORS (Hydraulic)

Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, Ohio.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.
Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich.
Vickers, Inc., 1480 Oakman Blvd., Detroit 32, Mich.

MOUNTINGS (Rubber)

Goodrich, B. F., Co., The, Akron 18, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

MUCK BAR

Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

NAILS (*Also stainless)

Alan Wood Steel Co., Conshohocken, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
*Columbia Steel Co., San Francisco 6, Cal.
Continental Steel Corp., Kokomo, Ind.
*Hassall, John, Inc., 402 Oakland St., Brooklyn 22, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Keystone Steel & Wire Co., Peoria 7, Ill.
*Republic Steel Corp., Dept. ST, Cleveland 4, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

NAILS (Coated & Galvanized)

Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Keystone Steel & Wire Co., Peoria 7, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

NAME PLATES

Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

NIBBLING MACHINES

Campbell, Andrew C., Div. American Chain & Cable Co., Inc., Bridgeport 2, Conn.

NICKEL (All Commercial Forms)

International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.

NITRIDING

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Pittsburgh Commercial Heat Treating Co., 49th St. & A.V.R.R., Pittsburgh 1, Pa.

NOZZLES

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

NUTS (*Also Stainless)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
*Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.
*Harper, H. M. Co., The, 2646 Fletcher St., Chicago 18, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
*National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland 13, O.
Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.

NUTS (Acorn or Cap)

Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
U. S. Automatic Corp., Amherst, O.

NUTS (Castellated)

Bethlehem Steel Co., Bethlehem, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Acme Co., The, 170 E. 131 St., Cleveland 8, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
U. S. Automatic Corp., Amherst, O.

NUTS (Machine Screw)

Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
U. S. Automatic Corp., Amherst, O.

NUTS (Nonferrous)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.

NUTS (Nonferrous) (Cont'd.)

National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
U. S. Automatic Corp., Amherst, O.

NUTS (Self Locking)

Bethlehem Steel Co., Bethlehem, Pa.
Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Standard Pressed Steel Co., Box 57W, Jenkintown, Pa.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland 13, O.

NUTS (Semi-finished)

Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Spring—Tension)

Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland 13, O.

NUTS (Wing)

Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

OFFICE EQUIPMENT

International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.
Remington Rand Inc., Systems Div., 315 Fourth Ave., New York 10, N. Y.

OIL CUPS

Gits Brothers Mfg. Co., 1836 S. Kilbourn Ave., Chicago 23, Ill.
Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

OIL SEALS

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago 22, Ill.
Gits Brothers Mfg. Co., 1836 S. Kilbourn Ave., Chicago 23, Ill.

OILS (COMPRESSOR)

Cities Service Co., 60 Wall Tower, New York 5, N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Sinclair Refining Co., 630 Fifth Ave., New York 20, N. Y.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York 4, N. Y.
Texas Co., The, 135 East 42nd St., New York 17, N. Y.

OILS (Hydraulic)

Brooks Oil Co., 315 E. Carson St., Pittsburgh 19, Pa.
Cities Service Companies, 60 Wall Tower, New York 5, N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Penola, Inc., 221 North La Salle St., Chicago 1, Ill.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York 4, N. Y.
Stuart, D. A., Oil Co., Ltd., 2735½ S. Troy St., Chicago 23, Ill.
Sun Oil Co., 1608 Walnut St., Dept. 1, Philadelphia 3, Pa.
Texas Co., The, 135 E. 42nd St., New York 17, N. Y.
Tide Water Associated Oil Co., 17 Battery Place, New York 4, N. Y.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Quenching)

Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.
Stuart, D. A., Oil Co., Ltd., 2735½ S. Troy St., Chicago 23, Ill.

OILS & COMPOUNDS (Cutting)

Cimcool Div., Cincinnati Milling Machine Co., Cincinnati 9, O.
Cities Service Co., 60 Wall Tower, New York 5, N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Penola, Inc., 221 North LaSalle St., Chicago 1, Ill.
Sinclair Refining Co., 630 Fifth Ave., New York 20, N. Y.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York 4, N. Y.
Stuart, D. A., Oil Co., Ltd., 2735½ S. Troy St., Chicago 23, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia 3, Pa.
Texas Co., The, 135 East 42nd St., New York 17, N. Y.
Tide Water Associated Oil Co., 17 Battery Place, New York 4, N. Y.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)

Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Electric Furnace Co., The, Salem, O.
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.
Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago 12, Ill.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

OVENS (Baking & Drying)

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland 11, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.
Wagner Litho Machinery Co., Hoboken, N. J.

OVENS (Coke, By-Product)

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

OVENS (Core and Mold)

Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland 11, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago 12, Ill.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.

OVENS (Gas or Oil Heat)

Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland 11, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago 12, Ill.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Independent Engineering Co., 105 W. Second St., O'Fallon, Ill.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.

PACKAGING (Protective)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

PACKING (Asbestos or Rubber)

Goodrich, B. F., Co., The, Akron 18, O.
Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

PACKING (Carbon or Graphite)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.

PACKINGS (Mechanical Leather)

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago 22, Ill.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

PAINT (Alkali Resisting)

Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

PAINT (Aluminum)

Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

PAINT (Aluminum Pigment)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

PAINT (Heat Resisting, Rust Preventing, Priming)

Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O.
American Chemical Paint Co., Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

PAINT (Marking)

American Crayon Co., Sandusky, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Markal Co., 631 N. Western Ave., Chicago 12, Ill.

PAINT (Stick Form)

American Crayon Co., Sandusky, O.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

PAINTING

Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh 1, Pa.

PAINTS, LACQUERS and VARNISHES (Industrial)

Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O.
National Lead Co., 111 Broadway, New York 6, N. Y.
Pittsburgh Plate Glass Co., Paint Div., 632 Duquesne Way, Pittsburgh 22, Pa.

PANS (Steel)

Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.

PAPER (Sensitized Photocopying)

Eastman Kodak Co., 343 State St., Rochester 4, N. Y.
Ozalid Products Div., General Aniline & Film Corp., Johnson City, N. Y.

PARTS (Precision)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Atlas Tool & Designing Co., Castor & Kensington Aves., Philadelphia 24, Pa.
Brandt, Charles T. Inc., 1700 Ridgely St., Baltimore 30, Md.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.

PARTS (Precision-Diesel)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.

PERFORATED METAL

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Chicago Perforating Co., 2443 W. 24th Pl., Chicago 8, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., 171 York St., Rochester 11, N. Y.
Harrington & King Perforating Co., The, 5634 Fillmore St., Chicago 44, Ill.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

PHENOL RECOVERY PLANTS

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, 19, Pa.

PHOSPHOR BRONZE—See METALS (Nonferrous)

PHOTO TEMPLATE EQUIPMENT

Eastman Kodak Co., 343 State St., Rochester 4, N. Y.

PHOTOGRAPHIC EQUIPMENT AND SUPPLIES

Eastman Kodak Co., 343 State St., Rochester 4, N. Y.

PICKERS (Vacuum and Mechanical)

Littell, F. J., Machine Co., 4165 N. Ravenswood Ave., Chicago 13, Ill.

PICKLING

Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh 1, Pa.

PICKLING COMPOUNDS

American Chemical Paint Co., Ambler, Pa.
Cleveland Cliffs Iron Co., The, Union Commerce Bldg., Cleveland 14, O.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

PICKLING EQUIPMENT

International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati 16, O.
Rolock, Inc., 1380 Kings Highway, Fairfield, Conn.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Youngstown Welding & Eng. Co., 3711 Oakwood Ave., Youngstown 9, O.

PICKLING MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Wean Engineering Co., Inc., The, Warren, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

PICKLING TANK LININGS

Ceilcote Co., 750 Rockefeller Bldg., Cleveland 13, O.
Goodrich, B. F., Co., The, Akron 18, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
National Lead Co., 111 Broadway, New York 6, N. Y.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

PICKLING TANKS—See TANKS (Pickling)

PIG CASTING MACHINES

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.

PIG IRON

Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland 14, O.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Pickands Mather & Co., Union Commerce Bldg., Cleveland 14, O.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh 22, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh 22, Pa.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.

PIG IRON (Silvery)

Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro-Metals Co., Keokuk, Ia.
Miller & Co., 332 S. Michigan Ave., Chicago 4, Ill.

PILING (Iron and Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Republic Steel Corp., Dept ST, Cleveland 4, O.
Weirton Steel Co., Weirton, W. Va.

PILING (Pipe)

American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

PILING (Pressure-Treated Wood)

Koppers Co., Wood Preserving Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

PILLOW BLOCKS (Anti-Friction)

Dodge Manufacturing Corp., Mishawaka, Ind.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
SKF Industries, Inc., Philadelphia 32, Pa.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

PINIONS (Mill)

Bethlehem Steel Co., Bethlehem, Pa.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
National Erie Corp., Erie, Pa.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh 22, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh 22, Pa.

PINS (Case Hardened or Heat Treated)

Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
U. S. Automatic Corp., Amherst, O.

PINS (Taper)

Moltrup Steel Products Co., Beaver Falls, Pa.
U. S. Automatic Corp., Amherst, O.

PIPE (Alloy) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
*National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
*Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
*Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

PIPE Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

PIPE (Brass, Bronze or Copper)

American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York 17, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

PIPE (Lead or Lead Lined)

National Lead Co., 111 Broadway, New York 6, N. Y.

PIPE (Non-Metallic)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.

PIPE (Rubber Lined)

Goodrich, B. F., Co., The, Akron 18, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

PIPE (Square and Rectangular)

National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

PIPE (Steel)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco 6, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

PIPE (Steel, Fabricated)

Power Piping Div. of Blaw-Knox Co., Beaver & Western Ave., Pittsburgh 2, Pa.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.

PIPE (Vitrified Clay)

Robinson Clay Products Co., The, 1100 Second National Bank Bldg., Akron 8, Ohio

PIPE BENDING

Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.
Power Piping Div. of Blaw-Knox Co., Beaver & Western Ave., Pittsburgh 2, Pa.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

PIPE CUTTING AND THREADING MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Landis Machine Co., Waynesboro, Pa.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.

PIPE DRIVERS

American Hoist & Derrick Co., St. Paul 1, Minn.

PIPE FITTINGS

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.

PIPE LINES (Riveted or Welded)

Bethlehem Steel Co., Bethlehem, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.

PIPE LINES (Seamless)

National Tube Co., Frick Bldg., Pittsburgh 30, Pa.

PIPE MILL MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh 22, Pa.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

PIPE STRAIGHTENING MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee 10, Wis.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh 22, Pa.

PIPE TOOLS

Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.

PIPE AND TUBE BENDING MACHINES

Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.

PIPING CONTRACTORS

Power Piping, Div. of Blaw-Knox Co., Beaver and Western Ave., Pittsburgh 2, Pa.

PISTON PINS

Bell Engineering Co., The, 2020 Chapman Highway, Knoxville 15, Tenn.

PISTON RINGS

American Hammered Piston Ring Div., Koppers Co., Baltimore 8, Md.
United States Graphite Co., The, Holland Ave., Saginaw, Mich.

PISTON RODS

Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
Wyckoff Steel Co., P. O. Box 1256, Pittsburgh 30, Pa.

PISTONS (Aluminum, Gray Iron)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O.
Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.

PLANERS

Baldwin Southwark Div., Baldwin Locomotive Works The, Paschall P. O., Philadelphia 42, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St Clair Ave., Cleveland 14, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Rockford Machine Tool Co., 2400 Kishwaukee St., Rockford, Ill.

PLATE CASTORS

Hyatt Bearings Div., General Motors Corp., Harrison, N. J.

PLATE PRESSING (Heavy)

Fort Pitt Bridge Works, Keystone Hotel, Pittsburgh 22, Pa.

PLATES (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

PLATES (Sheared or Universal) (*Also Stainless)

*Alan Wood Steel Co., Conshohocken, Pa.

PLATES (Sheared or Universal) (*Also Stainless) (Cont'd.)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
American Petrometal Corp., Broadway at 11th St., Long Island City 2, N. Y.
*American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Atlantic Steel Products Co., 1330 N. 30th St., Philadelphia 21, Pa.
Avondale Marine Ways, Inc., Westwego, La.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Columbia Steel Co., San Francisco 6, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.
Granite City Steel Co., Granite City, Ill.
Holliday, W. J., & Co., Hammond, Ind.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
*Republic Steel Corp., Dept. ST, Cleveland 4, O.
*Ryerson Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago 80, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
*United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

PLATES (Stainless Clad)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.

PLATES (Steel—Floor) —See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN or TERNE PLATE

PLATING EQUIPMENT

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Heil Process Equipment Co., 12903 Elmwood Ave., Cleveland 11, O.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.
Siefen, J. J., Co., 5857 Lauderdale Ave., Detroit 9, Mich.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.

PLATING SUPPLIES

duPont deNemours, E. I., & Co., Inc., Wilmington 98, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.
United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y.

PLIERS (Toggle)

Knu-Vise Products Co., 2200 8th Ave., Detroit 16, Mich.

PLUGS (Expansion)

Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.
Master Products Co., The, 6400 Park Ave., Cleveland 5, O.
Wrought Washer Mfg. Co., 2103 S. Bay St., Milwaukee 7, Wis.

POLE LINE MATERIAL

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.

POLES (Tubular Steel)

National Tube Co., Frick Bldg., Pittsburgh 30, Pa.

PORTABLE TOOLS AND ACCESSORIES

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.

POTENTIOMETERS

Bristol Co., The, Waterbury 91, Conn.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.

POTS (Annealing-Wire)

National Annealing Box Co., Washington, Pa.

POTS (Case Hardening)

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Rolock, Inc., 1380 Kings Highway, Fairfield, Conn.

POTS (Melting)

Farrel-Birmingham Co., Inc., Ansonia, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.

POTS (Tinning)

National Annealing Box Co., Washington, Pa.

POWDERS, METAL (Iron, Lead Brass & Copper)

New Jersey Zinc Co., 160 Front St., New York 7, N. Y.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

POWER UNITS (Diesel, Gasoline, Steam)

Propulsion Engine Corp., 7th & White Eagle Rd., Kansas City, Kans.
Ready-Power Co., The, 3824 Grand River Ave., Detroit 8, Mich.

POWER UNITS (Gasoline, Electric, for Industrial Trucks)

Ready-Power Co., The, 3824 Grand River Ave., Detroit 8, Mich.

PREHEATERS

Salem Engineering Co., 714 S. Broadway, Salem, O.

PRESS BRAKES

Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Cincinnati Shaper Co., The, Garrard and Elam Sts., Cincinnati 25, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.

PRESSED METAL PARTS

American Brass Co., The, Waterbury 88, Conn.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Budd Co., The, 25th St. & Hunting Park Ave., Philadelphia 32, Pa.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.
Worcester Pressed Steel Co., 501 Barber Ave., Worcester 6, Mass.

PRESSES

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak St., Hammond, Ind.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Colonial Broach Co., P.O. Box No. 37, Harper Sta., Detroit 13, Mich.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Galland-Henning Manufacturing Co., 2747 S. 31st St., Milwaukee 7, Wis.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee 10, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.
Warren City Mfg. Co., Warren, O.

PRESSES (Bending)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.
Zeh & Hahnemann Co., 56 Avenue A, Newark 5, N. J.

PRESSES (Extrusion)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.

PRESSES (Forging)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bigwood, Joshua, & Son Ltd. Wolverhampton, England
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.

PRESSES (Forming and Braking)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Cincinnati Shaper Co., The, Garrard and Elam Sts., Cincinnati 25, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.
Zeh & Hahnemann Co., 56 Avenue A, Newark 5, N. J.

PRESSES (Hydraulic)

Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Chambersburg Engineering Co., Chambersburg, Pa.
Colonial Broach Co., P.O. Box No. 37, Harper Sta., Detroit 13, Mich.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Galland-Henning Manufacturing Co., 2747 S. 31st St., Milwaukee 7, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Mfg. Co., 621-31 S. Kolmar Ave., Chicago 24, Ill.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee 10, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Morgan Engineering Co., The, Alliance, O.
National Erie Corp., Erie, Pa.
Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

PRESSES (Pneumatic)

Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.
Zeh & Hahnemann Co., 56 Avenue A, Newark 5, N. J.

PRESSES (Riveting)

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.

PRESSES (Stamping)

Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark 5, N. J.

PRESSES (Wax)

Bethlehem Steel Co., Bethlehem, Pa.

PRESSES, BRIQUETTING (Hydraulic)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.

PRESSURE VESSELS

Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
National Annealing Box Co., Washington, Pa.
Struthers Wells Corp., Titusville, Pa.

PROCESS ENGINEERING

Atlas Tool & Designing Co., Castor & Kensington Aves., Philadelphia 24, Pa.

PROTECTIVE PLASTIC COATINGS

Better Finishes & Coatings Inc., 268 Doremus Ave., Newark 5, N. J.

PUG MILLS

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.

PULLEYS (Magnetic)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.

PULLEYS (Pressed Steel)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo 7, O.
Worcester Pressed Steel Co., 501 Barber Ave., Worcester 6, Mass.

PULLEYS (Variable Speed)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Loveloy Flexible Coupling Co., 5071 W. Lake St., Chicago 44, Ill.

PULVERIZERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Pulverizer Co., 1539 Macklind Ave., St. Louis 10, Mo.
Gruendler Crusher & Pulverizer Co., 2915-17 N. Market St., St. Louis 6, Mo.

PUMPS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Ingersoll-Rand Co., 11 Broadway New York 4, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Oil Well Supply Co., Dallas 1, Tex.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Weinman Pump & Supply Co., The, 207-209 Blvd. of the Allies Pittsburgh 22, Pa.

PUMPS (Boiler Feed)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

PUMPS (Centrifugal)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Schneible, Claude B., Co., 2827 25th St., Detroit 16, Mich.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

PUMPS (Fuel Injection)

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.

PUMPS (Gas)

Roots-Connersville Blower Corp., Connersville, Ind.

PUMPS (High Pressure)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

PUMPS (Hydraulic)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Galland-Henning Manufacturing Co., 2747 S. 31st St., Milwaukee 7, Wis.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Hydro-Power, Inc., Belmont & Sheridan Aves., Springfield, O.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee 10, Wis.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.
Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich.
Vickers Inc., 0 Oakman Blvd., Detroit 32, Mich.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.

PUMPS (Lubricating)

Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

PUMPS (Reciprocating)

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.

PUMPS (Rotary)

Brown & Sharpe Mfg. Co., Providence 1, R. I.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Vickers, Inc., 1480 Oakman Blvd., Detroit 32, Mich.

PUMPS (Vacuum)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Saunders, Alexander & Co., 95 Bedford St., New York 14, N. Y.

PUMPS (Vertical Turbine)

DeLaval Steam Turbine Co., Trenton 2, N. J.
Layne & Bowler, Inc., Memphis 8, Tenn.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

PUNCHES (Multiple)

Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Cincinnati Shaper Co., The, Garrand and Elam Sts., Cincinnati 25, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.

PUNCHES (Piercing, Interchangeable)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Marchant, George F., Co., 1420 S. Rockwell St., Chicago 8, Ill.

PUNCHING AND SHEARING MACHINERY

Beatty Machine & Mfg. Co., 150th & Oak Sts. Hammond Ind.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Chamberburg Engineering Co., Chamberburg, Pa
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.
Wean Engineering Co., Inc., The, Warren, O.

PYROMETER TUBES

Bristol Co., The, Waterbury 91, Conn.
Carborundum Co., The, Niagara Falls, N. Y.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.
Norton Company, Worcester 6, Mass.

PYROMETERS

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.
Bristol Co., The, Waterbury 91, Conn.
Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.

RACKS & PINIONS

Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.

RADIATORS (Heating—Cast Iron)

Utica Radiator Corp., Utica 1, N. Y.

RAIL BREAKERS

United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.

RAILS (New and Relaying)

Foster, L. B. Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.
Midwest Steel Corp., Charleston, W. Va.
Rail & Industrial Equipment Co., 30 Church St., New York 7, N. Y.

RAILS (Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.

REAMERS

Barber-Colman Co., 150 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
National Automatic Tool Co. Inc., S. 7th & N Sts., Richmond, Ind.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

REAMERS (Carbide Tipped)

Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Gisholt Machine Co., 1245 E. Washington St., Madison 3, Wis.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

REBUILT EQUIPMENT

Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago 33, Ill.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECORD FORMS

Remington Rand Inc., Systems Div., 315 Fourth Ave., New York 10, N. Y.

RECORD KEEPING SYSTEMS

International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.
Remington Rand Inc., Systems Div., 315 Fourth Ave., New York 10, N. Y.

RECORDERS (Pressure, Speed, Temperature, Time)

Bristol Co., The, Waterbury 91, Conn.
International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.

RECTIFIERS (Dry Disc)

Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

RECTIFIERS (Mercury Arc)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

REDUCTION GEARS

American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.
DeLaval Steam Turbine Co., Trenton 2, N. J.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote Bros. Gear & Machine Co., 5225 S. Western Blvd., Chicago 9, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

REDUCTION GEARS (Cont'd.)

National Erie Corp., Erie, Pa.
Philadelphia Gear Works, Inc., Erie Ave., & G St., Philadelphia 34, Pa.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee 14, Wis.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Warren City Mfg. Co., Warren, O.
Westinghouse Electric Corp., 200 McCandless Ave., Pittsburgh 1, Pa.

REELS (Automatic Centering)

Littell, F. J., Machine Co., 4165 N. Ravenswood Ave., Chicago 13, Ill.

REELS (Coiling & Pay-Off)

Paxson Machine Co., Benton Rd., Salem, O.

REFRACTORIES (Chrome)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

REFRACTORIES (Dolomite)

Basic Refractories, Inc., Hanna Bldg., Cleveland 15, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

REFRACTORIES (Fire Clay)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Eureka Fire Brick Works, 1100 B. F. Jones Law Bldg., Pittsburgh 19, Pa.
Globe Brick Co., The, East Liverpool, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Robinson Clay Products Co., The, 1100 Second National Bank Bldg., Akron 8, O.

REFRACTORIES (Firestone)

Cleveland Quarries Co., The, Guildhall Bldg., Cleveland 15, O.

REFRACTORIES (For High Frequency Furnaces)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Carborundum Co., The, Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bdlg., Pittsburgh 22, Pa.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
Norton Co., Worcester 6, Mass.

REFRACTORIES (Forsterite)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

REFRACTORIES (High Alumina)

Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

REFRACTORIES (Insulating)

Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

REFRACTORIES (Magnesia)

Basic Refractories, Inc., Hanna Bldg., Cleveland 15, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Norton Co., Worcester 6, Mass.

REFRACTORIES (Magnesite)

Basic Refractories, Inc., Hanna Bldg., Cleveland 15, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

REFRACTORIES (Plastic)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Basic Refractories, Inc., Hanna Bldg., Cleveland 15, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

REFRACTORIES (Silica)

Carborundum Co., The, Niagara Falls, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Robinson Clay Products Co., The, 1100 Second National Bank Bldg., Akron 8, O.

REFRACTORIES (Silicon Carbide)

Bay State Abrasive Products Co., Union St., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Norton Co., Worcester 6, Mass.

REFRACTORY CEMENT AND CONCRETE

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.
Carborundum Co., The, Niagara Falls, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
Lumnite Div. Universal Atlas Cement Co., Dept. S, Chrysler Bldg., New York 17, N. Y.
Norton Co., Worcester 6, Mass.

REGULATORS (Pressure)

Bristol Co., The, Waterbury 91, Conn.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Metallizing Co. of America, 1330 W. Congress St., Chicago 7, Ill.
Square D Co., 6060 Rivard St., Detroit 11, Mich.

REGULATORS (Temperature)

Bristol Co., The, Waterbury 91, Conn.

REGULATORS (Voltage)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
General Electric Co., Schenectady 5, N. Y.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

REGULATORS (Welding & Cutting)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.

REINFORCEMENT FABRIC (Electric Welded)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

RELAYS (Magnetic)

Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

RESISTORS (Alloy Grid or Wire Wound—Electric)

Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Guyan Machinery Co., Logan, W. Va.
Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

RESISTORS (Graphite Disc)

Allen-Bradley Co., 1316 S. 2nd St., Milwaukee 4, Wis.

RESPIRATORS

Scott Aviation Corp., Lancaster, N. Y.
Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

RHEOSTATS

Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

RINGS (Aluminum, Brass, Bronze)

National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

RINGS (Steel)

Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.

RINGS (Weldless) (*Also Stainless)

*Jessop Steel Co., 584 Green St., Washington, Pa.
*Midvale Co., The, Nicetown, Philadelphia 40, Pa.

RIVET SETS

Marchant, George F., Co., 1420 S. Rockwell St., Chicago 8, Ill.
United States Steel Supply Co., P.O. Box M M, Chicago 90, Ill.

RIVETERS (Hydraulic—Portable and Stationary)

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.

RIVETERS (Pneumatic)

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Topflight Tool Co., York, Pa.

RIVETING MACHINERY

Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.

RIVETS (*Also Stainless)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Champion Rivet Co., The, 11200 Harvard Ave., Cleveland 5, O.
*Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
Hassall, John, Inc., 402 Oakland St., Brooklyn 22, N. Y.
*National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., The, 5341 Grant Ave., Cleveland 5, O.

RIVETS (Blind)

Clark Equipment Co., Buchanan, Mich.

RIVETS (Nonferrous)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
*Hassall, John, Inc., 402 Oakland St., Brooklyn 22, N. Y.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

RODS (Alloy)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.

RODS (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

RODS (Brass, Bronze, Phosphor Bronze, Silicon Bronze, Copper, Nickel Silver)

American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York 17, N. Y.
Riverside Metal Co., The, Riverside, N. J.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Seymour Manufacturing Co., The, 51 Franklin St., Seymour, Conn.

RODS (Drill)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crane-Schrage Steel Co., 1025 S. Oakwood Ave., Detroit 25, Mich.

Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kloster Steel Corp., 224 N. Justine St., Chicago 7, Ill.
Latrobe Electric Steel Co., Latrobe, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis 7, Ind.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

RODS (Iron and Steel)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kloster Steel Corp., 224 N. Justine St., Chicago 7, Ill.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Roebling's, John A., Sons Co., Trenton 2, N. J.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

RODS (Rounds, Flats and Shapes) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleevland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Copperweld Steel Co., Warren, O.
*Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
*Follansbee Steel Corp., Pittsburgh 30, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
*Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
*United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

RODS (Threaded)

Bethlehem Steel Co., Bethlehem, Pa.
Central Screw Co., Chicago 9, Ill.
Continental Screw Co., New Bedford, Mass.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall, & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.

RODS (Wire)—See WIRE PRODUCTS

ROLL FORMING MACHINES

Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

ROLL HEATERS—See HEATERS (Electric Roll)

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL ENGINEERS (Consulting and Contracting)

Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.

ROLLING MILL EQUIPMENT

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Alliance Machine Co., The, Alliance, O.
Bigwood, Joshua, & Son Ltd., Wolverhampton, England
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown 1, O.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hallden Machine Co., The, Thomaston, Conn.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh 3, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Morgan Construction Co., Worcester 5, Mass.
Morgan Engineering Co., The, Alliance, O.
Paxson Machine Co., Benton Rd., Salem, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.
Wean Engineering Co., Inc., The, Warren, O.

ROLLING MILL MACHINERY (Used)

Foster, Frank B., 829 Oliver Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES AND ROLLERS

Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.

ROLLS (Bending and Straightening)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
National Roll & Machine Co., 954 Ansel Rd., Cleveland 3, O.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Wean Engineering Co., Inc., The, Warren, O.
Webb Corp., The, Webb City, Mo.

ROLLS (Forming)

National Roll & Machine Co., 954 Ansel Rd., Cleveland 3, O.

ROLLS (Iron and Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh 3, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Ohio Steel Foundry Co., Lima & Springfield, O.
Pittsburgh Rolls Div., Blaw-Knox Co., Pittsburgh 1, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.

ROLLS (Nonferrous)

National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

ROLLS (Sand and Chilled)

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Birdsboro Steel Fdry. & Mach. Co., Grant Bldg., Pittsburgh 19, Pa.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh 3, Pa.
Mesta Machine Co., P. O. Box 1466 Pittsburgh 30, Pa.
Ohio Steel Foundry Co., Lima & Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh 1, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh 22, Pa.

ROLLS (Tinning Machine)

American Shear Knife Co., P. O. Box 355, Homestead, Pa.
National Roll & Machine Co., 954 Ansel Rd., Cleveland 3, O.
Wean Engineering Co., Inc., The, Warren, O.

ROOFING (Plastic and Liquid)

Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh 19, Pa.

ROOFING, SIDING & FLASHING

American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Plasteel Products Co., Washington, Pa.

ROOFING AND SIDING (Corrugated and Plain)

American Rolling Mill Co., The 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco 6, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
New Jersey Zinc Co., 160 Front St., New York 7, N. Y.
Plasteel Products Co., Washington, Pa.
Reliance Steel Corp. Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago 80, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.

ROTARY CONVERTERS

Kato Engineering Co., Mankato, Minn.

RUBBER GOODS (Industrial)

Boston Woven Hose & Rubber Co., P.O. Box 1071, Boston 3, Mass.
Gates Rubber Co., The, 999 S. Broadway, Denver 17, Colo.
Goodrich, B. F., Co., The, Akron 18, O.
Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

RUBBER LINING (Hard and Soft)

United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

RUST PREVENTIVES

American Chemical Paint Co., Ambler, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
International Rustproof Corp., 12507-15 Plover Ave., Cleveland 7, O.
Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.
Kondor Products Corp., West Clifton Blvd. at Sloane, Cleveland 7, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Rheem Research Products Inc., 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.
Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.

RUST PROOFING PROCESSES AND EQUIPMENT

American Chemical Paint Co., Ambler, Pa.
Detrex Corporation, Detroit 32, Mich.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
International Rustproof Corp., 12507-15 Plover Ave., Cleveland 7, O.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Oakite Products Inc., 34E Thames St., New York 6, N. Y.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit 11, Mich.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.

SAFE ENDS (Boiler Tube)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

SAFETY DEVICES (Electric)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

SAFETY EQUIPMENT

Hy-Test Div. International Shoe Co., 1509 Washington Ave., St. Louis 3, Mo.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Scott Aviation Corp., Lancaster, N. Y.
Thompson Industries, Inc., 29-05 Review Ave., Long Island City 1, N. Y.
Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

SAND BLAST EQUIPMENT

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Metallizing Co. of America, 1330 W. Congress St., Chicago 7, Ill.
Pangborn Corporation, Hagerstown, Md.
Sanstorm Mfg. Co., Santa Clara & H Sts., Fresno, Cal.
Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

SAND CONDITIONING AND PREPARING MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.
Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.

SAWING MACHINES (Hack)

Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.

SAWING MACHINES (Hot and Cold)

Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.
Morgan Engineering Co., The, Alliance, O.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh 22, Pa.
Wells Mfg. Corp., 1515 Filmore St., Three Rivers, Mich.

SAWS (Band—Metal Cutting)

Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Huther Bros. Saw Mfg. Co., Inc., 1290 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.
Wells Mfg. Corp., 1515 Filmore St., Three Rivers, Mich.

SAWS (Hack)

Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.

SAWS (Hot & Cold)

Huther Bros. Saw Mfg. Co., Inc., 1290 University Ave., Rochester, N. Y.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, O.

SAWS (Inserted Tooth, Cold)

Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Huther Bros. Saw Mfg. Co., Inc., 1290 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.

SAWS (Metal Cutting)

Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Disston, Henry, & Sons Inc., 126 Tacony, Philadelphia 35, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, O.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.
Super Tool Co., 21850 Hoover Rd., Detroit 13, Mich.
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.
Wells Mfg. Corp., 1515 Filmore St., Three Rivers, Mich.

SAWS (Segmental)

Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, O.
Simonds Saw & Steel Co., 1350 Columbia Rd. Boston 27, Mass.

SAWS (Woodworking)

Thomson Industries, Inc., 29-05 Review Ave., Long Island City 1, N. Y.

SCALES

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.

SCALES (Monorail)

American Monorail Co., The, 13102 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCREENS (Vibrating)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Robins Conveyors, Inc., Div. of Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

SCREENS AND SIEVES

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Chicago Perforating Co., 2443 W. 24th Pl., Chicago 8, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., 171 York St., Rochester 11, N. Y.
Harrington & King Perforating Co., The, 5634 Fillmore St., Chicago 44, Ill.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh 19, Pa.
Robins Conveyors, Inc., Div. of Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

SCREW EXTRACTORS

Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
New Britain Machine Co., New Britain, Conn.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.
U. S. Automatic Corp., Amherst, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)

Brown & Sharpe Mfg. Co., Providence 1, R. I.
Cleveland Automatic Machine Co., The, 2269 Ashland Rd., Cleveland 3, O.
Cone Automatic Machine Co., Inc., Windsor, Vt.
Greenlee Bros. & Co., 1927 Mason Ave., Rockford, Ill.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.
New Britain Machine Co., New Britain, Conn.
Sheffield Corp., The, 721 Springfield St., Dayton 1, O.

SCREW PLATES

Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWDRIVERS (Power)

Detroit Power Screwdriver Co., 2813 W. Fort St., Detroit 16, Mich.

SCREWS (Cap, Set, Safety-Set)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Bristol Co., The, Waterbury 91, Conn.
Chandler Products Corp., Euclid 17, O.
Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.
Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.
U. S. Automatic Corp., Amherst, O.

SCREWS (Cold Headed)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
American Screw Co., Providence 1, R. I.
Chandler Products Corp., Euclid 17, O.
Ferry Cap & Set Screw Co. 2151 Scranton Rd., Cleveland 13, O.
Hassall, John, Inc., 402 Oakland St., Brooklyn 22, N. Y.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.

SCREWS (Conveyor)

Lee Spring Co., Inc., 30 Main St., Brooklyn, 1, N. Y.

SCREWS (Hardened Metallic Drive)

American Screw Co., Providence 1, R. I.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
U. S. Automatic Corp., Amherst, O.

SCREWS (Hardened Self-Tapping)

American Screw Co., Providence 1, R. I.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.

SCREWS (Lag)

Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Republic Steel Corp., Upson Nut Div., Dept. St., 1912 Scranton Rd., Cleveland 13, O.
Russell, Burdsall, & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.

SCREWS (Machine)

American Screw Co., Providence 1, R. I.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.
U. S. Automatic Corp., Amherst, O.

SCREWS (Machine, Recessed Head)

American Screw Co., Providence 1, R. I.
Bristol Co., The, Waterbury 91, Conn.
Central Screw Co., Chicago 9, Ill.
Chandler Products Corp., Euclid 17, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit 4, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
U. S. Automatic Corp., Amherst, O.

SCREWS (Nonferrous and Stainless)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Screw Co., Providence 1, R. I.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Harper, H. M. Co., The, 2646 Fletcher St., Chicago 18, Ill.
Hassall, John, Inc., 402 Oakland St., Brooklyn 22, N. Y.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.

SCREWS (Sheet Metal, Recessed Head)

American Screw Co., Providence 1, R. I.
Bristol Co., The, Waterbury 91, Conn.
Central Screw Co., Chicago 9, Ill.
Chandler Products Corp., Euclid 17, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co., Chicago, Ill.

SCREWS (Socket, Cold Forged)

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.
Bristol Co., The, Waterbury 91, Conn.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

SCREWS (Thread Cutting)

American Screw Co., Providence 1, R. I.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.

SCREWS (Thumb)

National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

SCREWS (Valve Tappet)

Chandler Products Corp., Euclid 17, O.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
U. S. Automatic Corp., Amherst, O.

SCREWS (Wood, Recessed Head)

American Screw Co., Providence 1, R. I.
Bristol Co., The, Waterbury 91, Conn.

Chandler Products Co., Euclid 17, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, O.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Parker, Charles, Co., The, Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Co., Nashua, N. H.

SCRUBBERS (Gas or Air)—See GAS SCRUBBERS

SEALING COMPOUNDS
Dewey & Almy Chemical Co., Cambridge 40, Mass.

SEALS (Oil and Grease)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago 22, Ill.
Goodrich, B. F., Co., The, Akron 18, O.

SEAMLESS STEEL TUBING—See TUBING (Seamless Steel)

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland 4, O.

SEWERAGE LINES (Vitrified Clay Pipe)
Robinson Clay Products Co., The, 1100 Second National Bank Bldg., Akron 8, O.

SHACKLES
Bethlehem Steel Co., Bethlehem, Pa.

SHAFT HANGERS—See HANGERS

SHAFTING
American Brass Co., The, Waterbury 88, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Craine-Schrage Steel Co., 1025 S. Oakwood Ave., Detroit 25, Mich.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis 7, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Wyckoff Steel Co., P. O. Box 1256, Pittsburgh 30, Pa.

SHAFTING (Flexible)
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.

SHAPER-PLANERS
Rockford Machine Tool Co., 2400 Kishwaukee St., Rockford, Ill.

SHAPERS
Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Cincinnati Shaper Co., The, Garrard and Elam Sts., Cincinnati 25, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
General Engineering & Mfg. Co., 1523 S. 10th St., St. Louis 4, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Rockford Machine Tool Co., 2400 Kishwaukee St., Rockford, Ill.

SHAPERS (Spindle)
Walker-Turner Co., Inc., 50123 Berckman St., Plainfield, N. J.

SHAPES (Deep Drawn)
Bethlehem Steel Co., Bethlehem, Pa.

SHAPES (Ferrous)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco 6, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Monarch Steel Co., 545 W. McCarty St., Indianapolis 7, Ind.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Wyckoff Steel Co., P. O. Box 1256 Pittsburgh 22, Pa.

SHAPES (Non-Ferrous)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Riverside Metal Co., The Riverside, N. J.

SHAPES SPECIAL (Steel)
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.

SHARPENING MACHINES (Hob, Cutter & Reamer)
Barber-Colman Co., 150 Loomis St., Rockford, Ill.

SHEAR BLADES
American Shear Knife Co., P. O. Box 355, Homestead, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.
Wapakoneta Machine Co., The, Wapakoneta, O.

SHEARS
Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.
Beverley Shear Co., 3004 W. 111th St., Chicago 43, Ill.
Bigwood, Joshua, & Son Ltd., Wolverhampton, England.
Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Cincinnati Shaper Co., The, Garrard and Elam Sts., Cincinnati 25, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Continental Foundry & Machine Co., Grant Bldg., Pittsburgh 19, Pa.
Hallden Machine Co., The, Thomaston, Conn.
Hyde Park Fdy. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
O'Neil-Irwin Mfg. Co., 304 8th Ave. S., Lake City 15, Minn.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh 22, Pa.

SHEARS (Throatless)
Beverley Shear Co., 3004 W. 111th St., Chicago 43, Ill.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Bigwood, Joshua, & Son Ltd., Wolverhampton, England.
Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.
Paxson Machine Co., Benton Rd., Salem, O.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.
Wapakoneta Machine Co., The, Wapakoneta, O.
Wean Engineering Co., Inc., The Warren, O.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

SHEAVES, V-BELT (Single & Multiple)
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Dodge Mfg. Corp., Mishawaka, Ind.
Foote, Brad, Gear Works, 1309 S. Cicero Ave., Cicero, 50, Ill.
Gates Rubber Co., The, 999 S. Broadway, Denver 17, Col.
Lovejoy Flexible Coupling Co., 5071 W. Lake St., Chicago 44, Ill.

SHEET BARS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Wisconsin Steel Co., 130 N. Michigan Ave., Chicago 1, Ill.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago 23, Ill.
Hyde Park Fdy. & Mach. Co., Hyde Park, Pa.
Mansaver Industries Inc., 3101 East St., New Haven 3, Conn.

SHEET METAL PRODUCTS—See Stamping)

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., The, Garrard and Elam Sts., Cincinnati 25, O.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.

SHEET STEEL PILING (New and Used)
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster L. B., Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.

SHEETS (Acid Resisting)
Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Sharon Steel Corp., Sharon, Pa.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.

SHEETS (Aluminum or Magnesium)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Reliance Steel Corp. Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

SHEETS (Black)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco 6, Calif.
Continental Steel Corp., Kokomo, Ind.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Reliance Steel Corp., Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

SHEETS (Brass, Bronze, Phosphor Bronze, Silicon Bronze, Copper, Nickel, Nickel Silver)
American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York 17, N. Y.
Riverside Metal Co., The, Riverside, N. J.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Seymour Manufacturing Co., The, 51 Franklin St., Seymour, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh 22, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco 6, Calif.

SHEETS (Corrugated) (Con't.)
Continental Steel Corp., Kokomo, Ind.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Petrometal Corp., Broadway at 11th St., Long Island City 2, N. Y.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh 22, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Reliance Steel Corp. Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

SHEETS (Electrolytic Zinc Coated)
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Weirton Steel Co., Weirton, W. Va.

SHEETS (Enameling)
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.

SHEETS (Galvanized)
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh 22, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco 6, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Reliance Steel Corp. Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.

SHEETS (High Finished)
Aluminum Co., of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh 22, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

SHEETS (Hot Rolled and Hot Rolled, Pickled and Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh 22, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco 6, Calif.
Continental Steel Corp., Kokomo, Ind.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
Reliance Steel Corp., Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

SHEETS (Lead or Lead Alloy Coated) (Con.)
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Continental Steel Corp., Kokomo, Ind.
National Lead Co., 111 Broadway, New York 6, N. Y.
Sharon Steel Corp., Sharon, Pa.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Weirton Steel Co., Weirton, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.

SHEETS (Long Terne)
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Reliance Steel Corp. Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

SHEETS (Perforated)
Diamond Mfg. Co., Wyoming, Pa.
Harrington & King Perforating Co., The, 5634 Filmore St., Chicago 44, Ill.

SHEETS (Roofing)—See ROOFING AND SIDING (Corrugated and Plain)

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. S-47 Brackenridge, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco 6, Calif.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Eastern Stainless Steel Corp., 122 Rolling Mill Ave., Baltimore 3, Md.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
McLouth Steel Corp., 300 S. Livernois Ave., Detroit, Mich.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Washington Steel Corp., 9 E. Beau St., Washington, Pa.

SHEETS (Stainless Clad)
Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Granite City Steel Co., Granite City, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.

SHEETS (Tin)—See TIN or TERNE PLATE

SHEETS (Tin Mill Black)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

SHEEVES V-BELT (Single & Multiple)
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.

SHELLS (Seamless Drawn)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.

SHIMS (Laminated)
Laminated Shim Co., Inc., 87 Union St., Glenbrook, Conn.

SHOES
Hy-Test Div. International Shoe Co., 1509 Washington Ave., St. Louis 3, Mo.

SHOES (Foundry)
Hy-Test Div. International Shoe Co., 1509 Washington Ave., St. Louis 3, Mo.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

SHOES (Safety)
Hy-Test Div. International Shoe Co., 1509 Washington Ave., St. Louis 3, Mo.

SHOOK (Crate & Box)
Rathborne, Hair & Ridgway Co., 1440 W. 21st Pl., Chicago 8, Ill.

SHOT (Peening)
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.

SHOT AND GRIT
Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.

Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh 1, Pa.

SHOT BLASTING

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.

SHOVELS (Power)

Northwest Engineering Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Thew Shovel Co., The Lorain, O.
Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.

SIEVES—See SCREENS AND SIEVES

SIGNS (Metal)

Webb Corp., The, Webb City, Mo.

SILICO-MANGANESE

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro Alloys Corp., Citizens Bldg., Canton 2, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

SILICON BRONZE

American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.

SILICON METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
Keokuk Electro-Metals Co., Keokuk, Ia.
Miller & Co., 332 S. Michigan Ave., Chicago 4, Ill.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N.Y.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

SKELP (Steel)

Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.

SKIP HOISTS (Materials Handling)

Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.
Dempster Brothers, Inc., Knoxville 17, Tenn.

SLAG GRANULATING MACHINES

(Blast Furnace & Open Hearth)
Brotius, Edgar E., Co., Sharpsburg P. O., Pittsburgh 15, Pa.

SLEEVES (Piston, Pump & Shaft)

Shenango-Penn Mold Co., 461 W. Third St., Dover, O.

SLEEVES AND EXTENSION SOCKETS

Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

SLITTERS

Bethlehem Steel Co., Bethlehem, Pa.
Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.
Cowles Tool Co., 2086 W. 110th St. Cleveland 2, O.
Paxson Machine Co., Benton Rd., Salem, O.
Simonds Saw & Steel Co., 1330 Columbia Rd., Boston 27, Mass.
Wapakoneta Machine Co., The, Wapakoneta, O.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

SLOTTERS

Rockford Machine Tool Co., 2400 Kishwaukee St., Rockford, Ill.

SMALL TOOLS

Barber-Colman Co., 150 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

SOAKING PITS

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.

SOLDER

Kester Solder Co., 4222 Wrightwood Ave., Chicago 39, Ill.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
National Lead Co., 111 Broadway New York 6, N. Y.

SOLDER (Silver)

Handy & Harman, 82 Fulton St., New York 7, N. Y.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

SOLDERING EQUIPMENT

Holden, A. F., Co., The, P.O. Box 1898, New Haven 8, Conn.
Lepel High Frequency Laboratories Inc., 39 W. 60th St., New York 23, N. Y.
Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

SOLENOIDS (Electric)

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
General Electric Co., Schenectady 5, N. Y.
Grayhar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

SOLVENT (Degreasing)

Detrex Corporation, Detroit 32, Mich.
Ave., Detroit 4, Mich.
duPont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Kondor Products Corp., West Clifton Blvd. at Sloane, Cleveland 7, O.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Pennsylvania Salt Mfg. Co., Dept., S. Pennsalt Cleaner Div., Philadelphia 7, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS (including Motorized)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Cleveland Worm & Gear Co., The, 3270 E. 80th St. Cleveland 4, O.
Falk Corporation, The, Milwaukee 8, Wis.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote, Brad Gear Works, 1309 S. Cicero Ave., Cicero 50, Ill.
Foote Bros. Gear & Machine Co., 5225 S. Western Blvd., Chicago 9, Ill.
Grant Gear Works, 2nd & B Sts., Boston 27, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.
James, D. O., Mfg., Co., 1140 W. Monroe St., Chicago 7, Ill.
Jones, W. A., Fdry. & Mach. Co. 4437 Roosevelt Rd., Chicago 24, Ill.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Ottumwa Iron Works, Ottumwa, Ia.
Philadelphia Gear Works Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
Westinghouse Electric Corp., 200 McCandless Ave., Pittsburgh 1, Pa.

SPIEGELEISEN

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.
New Jersey Zinc Co., 160 Front St., New York 7, N. Y.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia 2, Pa.

SPIKES (Screw)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST, Cleveland 4, O.

SPINDLES (Grinding)

Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Heald Machine Co., The, Worcester 6, Mass.

SPLICE BARS (Rail)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.

SPRAY BOOTHS

Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit 6, Mich.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
Metallizing Co. of America, 1330 W. Congress St., Chicago 7, Ill.

SPRINGS (*Also Stainless)

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago 24, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, Ohio.
Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn 1, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York 35, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

SPRINGS (Coil & Elliptic)

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago 24, Ill.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, O.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

SPRINGS (Compression)

*Accurate Spring Mfg. Co., 3823 W Lake St., Chicago 24, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Barnes, Wallace Co., The, Div. Associated Sping Corp., 97 Main St., Bristol, Conn.
Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, O.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

SPRINGS (Flat Coiled)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Athenia Steel Co., Clifton, N. J.
Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, O.
Washburn Wire Co., 118th & Harlem River, New York 35, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

SPRINGS (Oil Tempered—Flat)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Athenia Steel Co., Clifton, N. J.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, O.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

SPRINGS (Torsion)

Accurate Spring Mfg Co., 3823 W. Lake St., Chicago 24, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, O.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.

SPRINGS (Valve)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Raymond Mfg. Co., Associated Spring Corp., 280 S. Centre St., Corry, Pa.

SPRINKLERS (Automatic)

Automatic Sprinkler Corp. of America, Brittain St., Youngstown 8, O.
Blaw-Knox Sprinkler Div., Blaw-Knox Co., Blawnox, Pa.

SPROCKETS

Industrial Gear Mfg. Co., 4545 W. Van Buren St. Chicago 24, Ill.
Union Chain & Mfg. Co., Sandusky, O.

SPROCKETS, CHAIN (Roller)

Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.

SPROCKETS, CHAIN (Silent)

Industrial Gear Mfg. Co., 4545 W. Van Buren St., Chicago 24, Ill.

SPRUE CUTTERS

Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See listings marked "*" under individual product headings.

STAMPINGS

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago 24, Ill.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.

STAMPINGS (con.)

American Tube & Stamping Plant, (Stanley Wks.), Bridgeport 7, Conn.
Atlas Metal Stamping Co., Castor & Kensington Aves., Philadephia 24, Pa.
Barnes, Wallace, Co., The, Div. Associated Spring Corp. 97 Main St., Bristol, Conn.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Budd Co., The, 25th St. & Hunting Park Ave., Philadelphia 32, Pa.
Davis Brake Beam Co., Laurel Ave. & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester 11, N. Y.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.
Master Products Co., The, 6400 Park Ave., Cleveland 5, O.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Rheem Research Products, Inc., 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Stanley Works, The, New Britain & Bridgeport, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo 7, O.
Veeder-Root, Inc., Hartford 2, Conn.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit 16, Mich.
Worcester Pressed Steel Co., 501 Barber Ave., Worcester 6, Mass.
Wrought Washer Mfg. Co., 2103 S. Bay St., Milwaukee 7, Wis.

STAMPS (Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Cunningham, M. E. Co., 172 E. Carson St., Pittsburgh 19, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

STAPLES (Wire)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Continental Steel Corp., Kokomo, Ind.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Keystone Steel & Wire Co., Peoria 7, Ill.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

STARTERS (Electric Motor)

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 East 79th St., Cleveland 4, O.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Master Electric Co., The, 100 Davis Ave., Dayton, 1, Ohio.
Square D. Co., 4041 N. Richards St., Milwaukee 12, Wis.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

STEEL (Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
American Petrometal Corp., Broadway at 11th St., Long Island City 2, N. Y.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Anchor Drawn Steel Co., Latrobe, Pa.
Avondale Marine Ways, Inc., Westwego, La.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Colonial Steel Div., Vanadium-Alloys Steel Co., Grant Bldg., Pittsburgh 19, Pa.
Columbia Steel Co., San Francisco 6, Calif.
Copperweld Steel Co., Warren, O.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Frasse, Peter A., and Co., Inc., 17 Grand St., New York 13, N. Y.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Harrisburg Steel Corp., Harrisburg, Pa.
Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.
Kloster Steel Corp., 224 N. Justine St., Chicago 7, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Pittsburgh-Crucible Div., Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.
Stanley Works, The, New Britain & Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

STEEL (Alloy—Abrasive, Corrosion & Heat Resistant)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
American Rolling Mill Co., The, Rustless Iron & Steel Div., 3400 E. Chase St., Baltimore, 13, Md.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Frasse, Peter A., and Co., Inc., 17 Grand St., New York 13, N. Y.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Michiana Products Corp., Michigan City, Ind.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Pittsburgh-Crucible Div., Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Stanley Works, The, New Britain & Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.

STEEL (Alloy—Cold Finished)

American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Athenia Steel Co., Clifton, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Craine-Schrage Steel Co., 1025 W. Oakwood Ave., Detroit 25, Mich.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis 7, Ind.
Pittsburgh-Crucible Div., Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Sharon Steel Corp., Sharon, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Union Drawn Steel Div., of Republic Steel Corp., Massillon, O.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Wyckoff Steel Co., P. O. Box 1256, Pittsburgh 30, Pa.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
*Copperweld Steel Co., Warren, O.
Follansbee Steel Corp., Pittsburgh 30, Pa.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Finished)

American Petrometal Corp., Broadway at 11th St., Long Island City 2, N. Y.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Craine-Schrage Steel Co., 1025 W. Oakwood Ave., Detroit 25, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis 7, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Wyckoff Steel Co., P. O. Box 1256, Pittsburgh 22, Pa.

STEEL (Die)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Colonial Steel Div., Vanadium-Alloys Steel Co., Grant Bldg., Pittsburgh 19, Pa.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.

STEEL (High Speed or Carbon Tool)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Colonial Steel Div., Vanadium-Alloys Steel Co., Grant Bldg., Pittsburgh 19, Pa.
Copperweld Steel Co., Warren, O.
Craine-Schrage Steel Co., 1025 W. Oakwood Ave., Detroit 25, Mich.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Holliday, W. L., & Co., Hammond, Ind.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
National Broach & Mach. Co., 5600 St. Jean Ave., Detroit 13, Mich.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell St., Chicago 80, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.

STEEL (High Tensile, Low Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown 1, O.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Holliday, W. J., & Co., Hammond, Ind.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Pittsburgh-Crucible Div., Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Sharon Steel Corp., Sharon, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

STEEL (Nitrided)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.

STEEL (Screw Stock)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Craine-Schrage Steel Co., 1025 W. Oakwood Ave., Detroit 25, Mich.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.
Holliday, W. J., & Co., Hammond, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis 7, Ind.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Wyckoff Steel Co., P. O. Box 1256, Pittsburgh 30, Pa.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

STEEL (Specialties)

Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.

STEEL (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Athenia Steel Co., Clifton, N. J.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown 1, O.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Pittsburgh-Crucible Div., Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Thomas Steel Co., The, Warren, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Washburn Wire Co., 118th St. & Harlem River, New York 35, N. Y.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Div., The, Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

STEEL (Stainless)—See listings marked "*" under individual product headings.

STEEL (Strip)

Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.

STEEL (Strip—Brass, Bronze Copper and Nickel Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Stanley Works, The, New Britain & Bridgeport, Conn.
Thomas Steel Co., The, Warren, O.
Weirton Steel Co., Weirton, W. Va.

STEEL (Strip—Hot or Cold Rolled) (*Also Stainless)

Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
*American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
American Tube & Stamping Plant, (Stanley Wks.) Bridgeport 7, Conn.
Athenia Steel Co., Clifton, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., 1820 N. Central Ave., Chciago 39, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown 1, O.
Columbia Steel Co., San Francisco 6, Calif.
Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.
Follansbee Steel Corp., Pittsburgh 30, Pa.
*Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.
Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
McLouth Steel Corp., 300 S. Livernois Ave., Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Sharon Steel Corp., Sharon, Pa.
*Stanley Works, The, New Britain & Bridgeport, Conn.
*Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Thomas Steel Co., The, Warren, O.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
*United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Washburn Wire Co., 118th St. & Harlem River, New York 35, N. Y.
*Washington Steel Corp., 9 E. Beau St., Washington, Pa.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Worcester Pressed Steel Co., 501 Barber Ave., Worcester 6, Mass.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

STEEL (Strip—Lacquer Coated)

Thomas Steel Co., The, Warren, O.

STEEL (Strip—Solder Coated)

Thomas Steel Co., The, Warren, O.

STEEL Strip—Tin Coated)

Roebling's, John A., Sons Co., Trenton 2, N. J.
Sharon Steel Corp., Sharon, Pa.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York 35, N. Y.

STEEL (Strip—Zinc Coated)

American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Sharon Steel Corp., Sharon, Pa.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York 35, N. Y.
Weirton Steel Co., Weirton, W. Va.

STEEL (Structural) (*Also Stainless)

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
American Petrometal Corp., Broadway at 11th St., Long Island City 2, N. Y.
Bedford Foundry & Mach. Co., Bedford, Ind.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia 46, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago
Clinton Bridge Works, 101 S. Second St., Clinton, Iowa.
*Columbia Steel Co., San Francisco 6, Calif.
*Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.
Fort Pitt Bridge Works, Keystone Hotel, Pittsburgh 22, Pa.
Gage Structural Steel Co., 3123-41 S. Hayne Ave., Chicago 8, Ill.
Ingalls Iron Works Co., The, Birmingham 2, Ala.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
Midland Structural Steel Co., 1300-20 S. 54th Ave., Cicero 50, Ill.
*Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
*Sharon Steel Corp., Sharon, Pa.
Standard Steel Fabricating Co., Inc., 1640 W. Hanford St., Seattle 6, Wash.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
*United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

STEEL (Tool)

Kloster Steel Corp., 224 N. Justine St., Chicago 7, Ill.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDING, ETC.

STEEL PLATE CONSTRUCTION

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia 46, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore, 30, Md.
Clinton Bridge Works, 101 S. Second St., Clinton, Iowa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Gage Structural Steel Co., 3123-41 S. Hayne Ave., Chicago 8, Ill.
General American Transportation Corp., 514C Graybar Bldg., New York 17, N. Y.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Ingalls Iron Works Co., The, Birmingham 2, Ala.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.
Midland Structural Steel Co., 1300-20 S. 54th Ave., Cicero 50, Ill.
Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Standard Steel Fabricating Co., Inc., 1640 W. Hanford St., Seattle 6, Wash.
Struthers Wells Corp., Titusville, Pa.

STELLITE

Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STENCILS (Spray and Sand Blast)

Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

STEPS (Safety)

Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.

STOKERS

Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Stoel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.
Westinghouse Electric Corp., Steam Div., Lester, Pa.

STONES (Honing, Polishing, Sharpening)

Bay State Abrasive Products Co., Union St., Westboro, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester 6, Mass.
Sterling Grinding Wheel, The, Div. of The Cleveland Quarries Co., Tiffin, O.

STOOLS (Steel)

Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

STOPPERS (Cinder Notch)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Brosius, Edgar E., Co., Sharpsburg P. O., Pittsburgh 15, Pa.

STOPPERS (Rubber)

Rhoades, R. W. Metaline Co., Inc., 50-17 Fifth St., Long Island City 1, N. Y.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINES—
See BENDING & STRAIGHTENING MACHINES

STUDS (Iron & Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Central Screw Co., Chicago 9, Ill.
Ferry Cap & Set Screw Co., 2151 Scranton Rd., Cleveland 13, O.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
National Screw & Mfg. Co., The, 2440 E. 75th St., Cleveland 4, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.

SWAGING MACHINES

Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Torrington Co., The, Torrington, Conn.

SWITCHES (Electric)

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
Federal Electric Products Co., 50 Paris St., Newark 5, N. J.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
McGill Mfg. Co., Inc., Valparaiso, Ind.
Square D Co., 6060 Rivard St., Detroit 11, Mich.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS

Bristol Co., The, Waterbury 91, Conn.
Stewart-Warner Corp. Instrument Div. 1828 W. Diversey Pkwy., Chicago 14, Ill.
Veeder-Root, Inc., Hartford 2, Conn.
Westinghouse Electric Corp., Orange Ave., Newark 1, N. J.

TANKS (Gas Auxiliary)

Webb Corp., The, Webb City, Mo.

TANKS (Pickling)

Goodrich, B. F., Co., The, Akron 18, O.
National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
National Lead Co., 111 Broadway, New York 6, N. Y.
Stanwood Corp., 4825 W. Cortland St., Chicago 39, Ill.
Youngstown Welding & Eng. Co., 3711 Oakwood Ave., Youngstown 9, O.

TANKS (Plating)

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Goodrich, B. F., Co., The, Akron 18, O.
Hefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

TANKS (Quenching, Automatic)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.

TANKS (Storage, Pressure, Riveted, Welded)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Avondale Marine Ways, Inc., Westwego, La.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
General American Transportation Corp., 514C Graybar Bldg., New York 17, N. Y.
Ingalls Iron Works Co., The, Birmingham 2, Ala.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Mahon, R. C., Co., The 8650 Mt. Elliott Ave., Detroit 11, Mich.
National Annealing Box Co., Washington, Pa.
Rheem Research Products, 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Struthers Wells Corp., Titusville, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

TANKS (Wood or Steel, Rubber or Lead Lined)

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Goodrich, B. F., Co., The, Akron 18, O.
Heil Process Equipment Co., 12903 Elmwood Ave., Cleveland 11, O.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.
National Lead Co., 111 Broadway, New York 6, N. Y.

TAPPING MACHINES

Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati 9, O.
Foote-Burt Co., The, Cleveland 8, O.
Moline Tool Co., 102 20th St., Moline, Ill.
National Automatic Tool Co. Inc., S. 7th & N Sts., Richmond, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

TAPS AND DIES

Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.

TERNE PLATE—See TIN OR TERNE PLATE

TESTING EQUIPMENT (Hydrostatic)

Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.

TESTING EQUIPMENT (Laboratory)

Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.

TESTING MACHINERY (Materials)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
National Broach & Machine Co., 5600 St. Jean Ave., Detroit 18, Mich.

THERMIT WELDING EQUIPMENT & MATERIALS

Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.

THERMOMETERS

Bristol Co., The, Waterbury 91, Conn.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

THREAD CUTTING TOOLS

Detroit Tap & Tool Co., 8432 Butler St. Detroit 11, Mich.
Landis Machine Co., Waynesboro, Pa.

THREADING MACHINES

Landis Machine Co., Inc., Waynesboro, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

TIE PLATES

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

TIN OR TERNE PLATE

American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Follansbee Steel Corp., Pittsburgh 30, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

TIN PLATE MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.
Wean Engineering Co., Inc., The, Warren, O.

TITANIUM

Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

TONGS (Automatic)

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Heppenstall Co., Dept. TP, 4620 Hatfield St., Pittsburgh 1, Pa.

TONGS (Chain Pipe)

Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

TONGS (Crucible & Flask for Precision Casting)

Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.
Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

TONGS (Rail Handling)

Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago 28, Ill.

TOOL BITS

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Colonial Steel Div., Vanadium-Alloys Steel Co., Grant Bldg., Pittsburgh 19, Pa.
Crane-Schrage Steel Co., 1025 S. Oakwood Ave., Detroit 25, Mich.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Jessop Steel Co., 584 Green St., Washington, Pa.

TOOL BITS (High Speed)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Crane-Schrage Steel Co., 1025 S. Oakwood Ave., Detroit 25, Mich.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Disston, Henry & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.

TOOL DESIGNING & BUILDING

Atlas Tool & Designing Co., Castor & Kensington Aves., Philadelphia 24, Pa.
Merz Engineering Co., Indianapolis 7, Ind.

TOOL HARDENING

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.

TOOL HOLDERS

Bellows Senacon Co., The, 798 N. Main St., Akron 10, O.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y..

TOOLS (Carbide Tipped)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kennametal, Inc., Latrobe, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

TOOLS (Diamond)

Diamond Tool Co., 933 E. 41st St., Chicago 15, Ill.

TOOLS (Hand)

New Britain Machine Co., New Britain, Conn.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

TOOLS (Non-Sparking, Safety)

Ampco Metal, Inc., Dept. S8, Milwaukee 4, Wis.

TOOLS (Pneumatic)

Bellows Senacon Co., The, 798 N. Main St., Akron 10, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland 14, O.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

TOOLS (Precision, Metal Cutting, etc.)

Barber-Colman Co., 150 Lommis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence 1, R. I.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit 6, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.

Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kennametal, Inc., Latrobe, Pa.
Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Micromatic Hone Corp., 1800 Schoolcraft Ave., Detroit 4, Mich.
National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.
Potter & Johnston Machine Co., 1027 Newport Ave., Pawtucket, R. I.
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.
South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.
Super Tool Co., 21650 Hoover Rd, Detroit 13, Mich.
Topflight Tool Co., York, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

TORCHES & BURNERS (Acetylene, Blow, Oxy-Acetylene)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.

TORCHES & BURNERS (Air—Gas)

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.

TOWBOATS

Avondale Marine Ways, Inc., Westwego, La.
Ingalls Iron Works Co., The, Birmingham 2, Ala.

TOWERS (Transmission)

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.

TRACK ACCESSORIES

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B. Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

TRACK BOLTS—See BOLTS (Track)

TRAILERS

Mercury Manufacturing Company, The, 4140 S. Halsted St., Chicago 9, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAMRAILS

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.

TRANSFORMERS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Westinghouse Electric Corp., Sharon, Pa.

TRANSFORMERS (Resistance Welding)

General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Progressive Welder Co., 5050 E. Outer Dr., Detroit 12, Mich.
Taylor-Winfield Corp., Warren, O.

TRANSMISSIONS (Automotive)

Clark Equipment Co., Buchanan, Mich.
Cleveland Worm & Gear Co., The, 3270 E. 80th St., Cleveland 4, O.
James, D. O. Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.

TRANSMISSIONS (Hydraulic)

Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.
Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich.
Vickers, Inc., 1480 Oakman Blvd., Detroit 32, Mich.

TRANSMISSIONS—VARIABLE SPEED

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Lovejoy Flexible Coupling Co., 5071 W. Lake St., Chicago 44, Ill.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

TREADS (Safety)

Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Norton Company, Worcester 6, Mass.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh 1, Pa.
United States Steel Supply Co., P. O. Box MM. Chicago 90, Ill.

TROLLEYS

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp., 118 Fremont Ave., Tonawanda, N. Y.
Ford Chain Block Div., American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia 22, Pa.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

TRUCK CRANES

Dempster Brothers, Inc., Knoxville 17, Tenn.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
Thew Shovel Co., The, Lorain, O.

TRUCKS (Barrel)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.

TRUCKS (Boom)

Dempster Brothers, Inc., Knoxville 17, Tenn.

TRUCKS (Dump-Industrial)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Clark Tructractor Div. Clark Equipment Co., Battle Creek, Mich.
Dempster Brothers, Inc., Knoxville 17, Tenn.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland 14, O.
Towmotor Corp., 1223 E. 152nd St., Cleveland 10, O.

TRUCKS (Hand)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.

TRUCKS (Hydraulic Lift)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland 13, O.
Clark Tructractor Div. Clark Equipment Co., Battle Creek, Mich.
Dempster Brothers, Inc., Knoxville 17, Tenn.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland 14, O.
Towmotor Corp., 1223 E. 152nd St., Cleveland 10, O.
Truck-Man, Inc., 1410 W. Ganson St., Jackson, Mich.

TRUCKS (Industrial)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland 13, O.
Clark Tructractor Div. Clark Equipment Co., Battle Creek, Mich.
Dempster Brothers, Inc., Knoxville 17, Tenn.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland 14, O.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.
Rapids Standard Co., Inc., The, Peoples Natl. Bank Bldg., Grand Rapids 2, Mich.
Ross Carrier Corp., Benton Harbor, Mich.
Towmotor Corp., 1223 E. 152nd St., Cleveland 10, O.
Truck-Man, Inc., 1410 W. Ganson St., Jackson, Mich.

TRUCKS (Lift)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland 13, O.
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., 4501 St. Clair Ave., Cleveland 14, O.
Ross Carrier Corp., Benton Harbor, Mich.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.
Towmotor Corp., 1223 E. 152nd St., Cleveland 10, O.
Truck-Man, Inc., 1410 W. Ganson St., Jackson, Mich.

TRUCKS (Straddle)

Ross Carrier Corp., Benton Harbor, Mich.

TRUCKS AND TRACTORS (Electric Industrial)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland 13, O.
Elwell-Parker Electric Co., 4501 St. Clair Ave., Cleveland 14, O.

TRUCKS AND TRACTORS (Gasoline or Diesel—Industrial)

Baker-Raulang Co., The, 2167 W. 25th St., Cleveland 13, O.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland 14, O.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.
Towmotor Corp., 1223 E. 152nd St., Cleveland 10, O.
Truck-Man, Inc., 1410 W. Ganson St., Jackson, Mich.

TUBE FITTINGS

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Stewart-Warner Corp., Alemite Div., 1828 W. Diversey Pkwy., Chicago 14, Ill.
Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.

TUBE MILL EQUIPMENT

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.
Bigwood, Joshua, & Son Ltd., Wolverhampton, England
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh 3, Pa.
Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

TUBE WELDING MACHINES

Bigwood, Joshua, & Son Ltd., Wolverhampton, England.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.

TUBES (Alloy Steel) (*Also Stainless)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
*Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
*National Annealing Box Co., Washington, Pa.
*National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
*Steel and Tubes Div. Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

TUBES (Beryllium Cooper)

Tube Reducing Corp., Wallington, N. J.

TUBES (Bimetal)

American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.
Tube Reducing Corp., Wallington, N. J.

TUBES (Boiler)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
461 W. Third St., Dover, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Ohio Seamless Tube Co., The, Shelby, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

TUBES (Brass, Bronze, Copper, Nickel, Nickel Silver)

American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

TUBES (Combustion)

Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.

TUBES (High Carbon)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.

TUBES (High Carbon) (Cont'd.)

National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Ohio Seamless Tube Co., The, Shelby, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Tube Reducing Corp., Wallington, N. J.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

TUBES (Seamless Steel)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco 6, Calif.
Frasse, Peter A., and Co., Inc., 17 Grand St. New York 13 N. Y.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Ohio Seamless Tube Co., The, Shelby, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Tube Reducing Corp., Wallington, N. J.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

TUBING (Alloy Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
*Columbia Steel Co., San Francisco 6, Calif.
*Frasse, Peter A. & Co., Inc., 17 Grand St. New York 13 N. Y.
*Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit 12, Mich.
*National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Ohio Seamless Tube Co., The, Shelby, O.
*Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Tube Reducing Corp., Wallington, N. J.
*Tubular Service Corp., 32 Broadway, New York 4, N. Y.
*United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
*Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

TUBING (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

TUBING (Brass, Silicon-Bronze, Copper or Monel)

American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.
Bundy Tubing Co., 8109 E. Jefferson Ave., Detroit 14, Mich.
Calumet & Hecla Consolidated Copper Co., Wolverine Tube Div., 1439 Central Ave., Detroit 9, Mich.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Revere Copper & Brass Inc., 230 Park Ave., New York 17, N. Y.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

TUBING (Condenser)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13 N. Y.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

TUBING (Flexible Metal)

American Brass Co., The, Waterbury 88, Conn.
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.
Penflex Sales Co., Div. of Pennsylvania Flexible Metallic Tubing Co., 7250 Powers Lane, Philadelphia 42, Pa.

TUBING (Mechanical)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13 N. Y.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit 12, Mich.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Tube Reducing Corp., Wallington, N. J.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

TUBING (Rubber)

Boston Woven Hose & Rubber Co., P.O. Box 1071, Boston 3, Mass.
Goodrich, B. F., Co., The, Akron 18, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

TUBING (Seamless)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Tube Reducing Corp., Wallington, N. J.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

TUBING (Seamless, Aluminum)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

TUBING (Square, Rectangular and Shapes) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
*Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit 12 Mich.
*National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Ohio Seamless Tube Co., The, Shelby, O.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.
*Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

TUBING (Welded)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Steel and Tubes Div. Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.

TUBING (Welded Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.
Bundy Tubing Co., 8109 E. Jefferson Ave., Detroit 14, Mich.
*Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Frasse, Peter A., and Co., Inc., 17 Grand St., New York 13 N. Y.
*Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit 12, Mich.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Ohio Seamless Tube Co., The, Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Revere Copper & Brass Inc., 230 Park Ave., New York 17, N. Y.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.
*Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.
*Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

TUBULAR PRODUCTS

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bundy Tubing Co., 8109 E. Jefferson Ave., Detroit 14, Mich.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit 12, Mich.
National Tube Co., Frick Bldg., Pittsburgh 30, Pa.
Ohio Seamless Tube Co., The, Shelby, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.
Tubular Service Corp., 32 Broadway, New York 4, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

TUMBLING BARRELS—SEE BARRELS (Tumbling)

TUNGSTEN CARBIDE

Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

TUNGSTEN CARBIDE (Tools and Dies)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kennametal, Inc., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.

TURBINES (Steam)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
DeLaval Steam Turbine Co., Trenton 2, N. J.
General Electric Co., Schenectady 5, N. Y.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

TURBO BLOWERS—See BLOWERS

TURNTABLES

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.
Bethlehem Steel Co., Bethlehem, Pa.

TURRET LATHES—See LATHES (Turret)

TURRET LATHE CUTTERS (Carbide Tipped)

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kennametal, Inc., Latrobe, Pa.

TWIST DRILLS

Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.
Greenfield Tap & Die Corp., Greenfield, Mass.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

TYPE (Steel)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh 19, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

VACUUM CLEANERS

Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

VACUUM TUBES (Industrial Power)

General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.

VALVE CONTROLS

Bristol Co., The, Waterbury 91, Conn.
Philadelphia Gear Works Inc., Erie Ave. & G St., Philadelphia 34, Pa.

VALVE CONTROLS (Motor-Operated Units)

Bristol Co., The, Waterbury 91, Conn.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

VALVES (Air Blast)

Littell, F. J., Machine Co., 4165 N. Ravenswood Ave., Chicago 13, Ill.

VALVES (Blast Furnace)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Brosius, Edgar E., Co., Inc., Sharpsburg P.O., Pittsburgh 15, Pa.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
R-S Products Corp., Philadelphia 44, Pa.

VALVES (Blow-off)

Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.

VALVES (Butterfly)

R-S Products Corp., Philadelphia 44, Pa.

VALVES (Check)

Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.
Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.

VALVES (Chemical)

Goodrich, B. F., Co., The, Akron 18, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

VALVES (Compressed Gas Cylinder)

Linde Air Products Co., The, 30 E. 42nd St. New York 17, N. Y.
Scott Aviation Corp., Lancaster, N. Y.

VALVES (Control—Air or Hydraulic)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42 Pa.
Bellows Senacon Co., The, 798 N. Main St., Akron 10, O.
Bristol Co., The, Waterbury 91, Conn.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee 7, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
R-S Products Corp., Philadelphia [illegible] Pa.
Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich.
Vickers, Inc., 1180 Oakman Blvd., Detroit 32 Mich.
Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.

VALVES (Electrically Operated)

Bristol Co., The, Waterbury 91, Conn.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee 7, Wis.
R-S Products Corp., Philadelphia 44, Pa.

VALVES (Foot)

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Galland-Henning Mfg. Co., 2747 S. 31st St. Milwaukee 7, Wis.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.

VALVES (Gas and Air Reversing)

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa
Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

VALVES (Gate)

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Reading-Pratt & Cady Div., of American Chain & Cable Co., Inc., Reading, Pa.

VALVES (Globe)

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.

VALVES (Goggle)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.

VALVES (Hydraulic)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Philadelphia 42, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa
Denison Engineering Co., The, 1163 Dublin Rd., Columbus 16, O.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee 7, Wis.
Homestead Valve Mfg. Co., P. O. Box 22 Coraopolis, Pa.
Hydraulic Press Mfg. Co., The, Mt. Gilead, O.
Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.
R-S Products Corp., Philadelphia [illegible] Pa.
Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich.
Vickers Inc., 1180 Oakman Blvd., Detroit 32 Mich.
Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.

VALVES (Needle)

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall, P. O., Philadelphia 42, Pa.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading Pa.

VALVES (Plug)

Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.

VALVES (Steam, Water)

R-S Products Corp., Philadelphia 44, Pa.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.

VANADIUM

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y
Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

VENTILATING EQUIPMENT

Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.
Burt Mfg. Company, The, 400 S. High St., Akron 11, O.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Plasteel Products Co., Washington, Pa.
Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

VENTILATORS (Roof)

Burt Mfg. Company, The, 400 High St., Akron 11, O.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Plasteel Products Co., Washington, Pa.

VIADUCTS (Steel)—See BRIDGES, ETC.

VIBRATION DAMPENERS

Goodrich, B. F., Co., The, Akron 18, O.
The Korfund Co., Inc., 48-37 Thirty Second Place, Long Island City 1, N. Y.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

VIBRATION ELIMINATORS, PIPING

Power Piping Div., Blaw-Knox Co., Beaver & Western Aves., Pittsburgh 2, Pa.

VIBRATION ISOLATORS (Steel Springs)

The Korfund Co., Inc., 48-37 Thirty Second Place, Long Island City 1, N. Y.

VISES (Pneumatic)

Bellows Senacon Co., The, 798 N. Main St., Akron 10, O.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago 24, Ill.

WALKWAYS—See FLOORING—(Steel)

WASHERS (Iron and Steel)

Beal Tool Div. (Hubbard & Co.) 110 Shamrock St., East Alton, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Budd Co., The, 25th St. & Hunting Park Ave., Philadelphia 32, Pa.
Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.
Master Products Co., The, 6400 Park Ave., Cleveland 5, O.
Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.
U. S. Automatic Corp., Amherst, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit 16, Mich.
Wrought Washer Mfg. Co., 2103 S. Bay St., Milwaukee 7, Wis.

WASHERS (Lead)

Master Products Co., The, 6400 Park Ave., Cleveland 5, O.
National Lead Co., 111 Broadway, New York 6, N. Y.
Wrought Washer Mfg. Co., 2103 S. Bay St., Milwaukee 7, Wis.

WASHERS (Lock)

Beal Tool Div. (Hubbard & Co.) 110 Shamrock St., East Alton, Ill.
Wrought Washer Mfg. Co., 2103 S. Bay St., Milwaukee 7, Wis.

WASHERS (Nonferrous and Stainless)

Beal Tool Div. (Hubbard & Co.) 110 Shamrock St., East Alton, Ill.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.
Master Products Co., The, 6400 Park Ave., Cleveland 5, O.
Shenango-Penn Mold Co., 461 W. Third St., Dover, O.
U. S. Automatic Corp., Amherst, O.
Wrought Washer Mfg. Co., 2103 S Bay St., Milwaukee 7, Wis.

WASHERS (Spring)

Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Beal Tool Div. (Hubbard & Co.) 110 Shamrock St., East Alton, Ill.
Master Products Co., The, 6400 Park Ave., Cleveland 5, O.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Wrought Washer Mfg. Co., 2103 S. Bay St., Milwaukee 7, Wis.

WATER COOLERS

Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Westinghouse Electric Corp., 653 Page Blvd., Springfield 2, Mass.

WATER FILTRATION & SOFTENING EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Carborundum Co., The, Niagara Falls, N. Y.

WELDED SHEET METAL ASSEMBLIES

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Warren City Mfg. Co., Warren, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

WELDED STEEL CONSTRUCTION

Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore, 30, Md.
Clinton Bridge Works, 101 S. Second St., Clinton, Iowa.
Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fort Pitt Bridge Works, Keystone Hotel, Pittsburgh 22 Pa.
Gage Structural Steel Co., 3123-41 S. Hayne Ave., Chicago 8, Ill.
Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11 Mich.
Midland Structural Steel Co., 1300-20 S. 54th Ave., Cicero 50, Ill.
Warren City Mfg. Co., Warren, O.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

WELDERS (Electric—Arc)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric Co., Schenectady 5, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis
Hobart Bros. Co., The, Box ST 172, Troy, O.
Lincoln Electric Co., The, Cleveland 1, O.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Penn Tool & Machine Co., Danville, Ill.
Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York 17, N. Y.

WELDERS (Electric Resistance)

Federal Machine & Welder Co., 202 Dana St., Warren, O.

WELDERS (Spot)

Federal Machine & Welder Co., 202 Dana St., Warren, O.
Progressive Welder Co., 3050 E. Outer Dr., Detroit 12, Mich.
Taylor-Winfield Corp., Warren, O.

WELDING

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Avondale Marine Ways, Inc., Westwego, La.
Bartlett-Hayward Div., Koppers Co., Baltimore 3, Md.
Falk Corporation, The, Milwaukee 8, Wis.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Lincoln Electric Co., The, Cleveland 1, O.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Penn Tool & Machine Co., Danville Ill.
Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Warren City Mfg. Co., Warren, O.
Wilson Welder & Metals Co., 60 E. 42nd St., New York 17, N. Y.

WELDING (Hard Surface)

Farrel-Birmingham Co., Inc., Ansonia, Conn.
Lincoln Electric Co., The, Cleveland 1, O.

WELDING (Resistance)

Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.
Taylor-Winfield Corp., Warren, O.
Warren City Mfg. Co., Warren, O.

WELDING (Stainless)

Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Penn Tool & Machine Co., Danville, Ill.
Youngstown Welding & Eng. Co., The, 3711 Oakwood Ave., Youngstown 9, O.

WELDING (Thermit)

Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee 1, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.
General Electric Co., Schenectady 5, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Hobart Bros. Co., The, Box ST 172, Troy, O.
Lincoln Electric Co., The, Cleveland 1, O.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric) (Cont'd.)

Oakite Products, Inc., 34E Thames St., New York 6, N. Y.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Square D. Co., 4041 N. Richards St., Milwaukee 12, Wis.
Tweco Products Co., Wichita 1, Kan.
United States Graphite Co., Holland Ave., Saginaw, Mich.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York 17, N. Y.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Oakite Products, Inc., 34E Thames St., New York 6, N. Y.

WELDING FIXTURES

Penn Tool & Machine Co., Danville, Ill.
Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.
Taylor-Winfield Corp., Warren, O.

WELDING POSITIONERS

Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago 23, Ill.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.

WELDING RODS (Alloy) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
*Alloy Rods Co., York, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.
*Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Champion Rivet Co., The, 11200 Harvard Ave., Cleveland 5, O.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
Handy & Harman, 82 Fulton St., New York 7, N. Y.
*Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
*Lincoln Electric Co., Cleveland 1, O.
*Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Reid-Avery Co., The, Cleveland & Chesapeake Sts., Baltimore 22, Md.
*Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
United States Steel Supply Co., P. O. Box MM, Chicago 90, Ill.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

WELDING RODS (Bronze)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
American Brass Co., The, Waterbury 88, Conn.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.
Bridgeport Brass Co., Bridgeport 2, Conn.
Lincoln Electric Co., The, Cleveland 1, O.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.
National Bearing Div., American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.

WELDING RODS (Cast Iron)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Champion Rivet Co., The, 11200 Harvard Ave., Cleveland 5, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Lincoln Electric Co., The, Cleveland 1, O.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

WELDING RODS (Hard Facing or Hard Surfacing)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Haynes Stellite Co., 30 E. 42nd St., New York 17, N. Y.
Lincoln Electric Co., The, Cleveland 1, O.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Taylor-Wharton Iron & Steel Co., Easton, Pa.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

WELDING RODS (Magnesium)

American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.

WELDING RODS (Tool Steel)

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Handy & Harman, 82 Fulton St., New York 7, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Hobart Bros. Co., The, Box ST 172, Troy, O.
Lincoln Electric Co., The, Cleveland 1, O.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

WELDING RODS OR WIRE

Air Reduction, 60 E. 42nd St., New York 17, N. Y.
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Brass Co., The, Waterbury 88, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.
Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.
Bridgeport Brass Co., Bridgeport 2, Conn.
Champion Rivet Co., The, 11200 Harvard Ave., Cleveland 5, O.
General Electric Co., Schenectady 5, N. Y.
Handy & Harman, 82 Fulton St., New York 7, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Hobart Brothers Co., The, Box ST 172, Troy, O.
Keystone Steel & Wire Co., Peoria 7, Ill.
Lincolin Electric Co., The, Cleveland 1, O.
Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.
Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.
Metallizing Co. of America, 1330 W. Congress St., Chicago 7, Ill.
Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh 30, Pa.
Reid-Avery Co., The, Cleveland & Chesapeake Sts., Baltimore 22, Md.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th
Seneca Wire & Mfg. Co., The, Fostoria, O.
Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.
United States Steel Supply Co., P. O. Box M M, Chicago 90, Ill.
Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York 17, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

WELL WATER SUPPLY SYSTEMS

Layne & Bowler, Inc., Memphis 8, Tenn.

WHEELS (Car, Locomotive or Truck)

American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
American Rolling Mill Co., The, 3701 Curtis Street, Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Clark Equipment Co., Buchanan, Mich.
Midvale Co., The, Nicetown, Philadelphia 40, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia 42, Pa.

WINCHES (Electric)

American Hoist & Derrick Co., St. Paul 1, Minn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.

WINCHES (Gasoline, Diesel)

Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.

WIRE (Alloy Steel) (*Also Stainless)

Allegheny Ludlum Steel Corp., Dept. S-47, Brackenridge, Pa.
American Rolling Mill Co., The, Rustless Iron & Steel Div., 3400 E. Chase St., Baltimore 13, Md.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
*Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Columbia Steel Co., San Francisco 6, Calif.
Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.
*Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
National-Standard Co., Niles, Mich.
*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
*Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's John A., Sons Co., Trenton 2, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE (Aluminum)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

WIRE (Annealed, Bright, Galvanized, Tinned, Coppered)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Columbia Steel Co., San Francisco 6, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Keystone Steel & Wire Co., Peoria 7, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's John A., Sons Co., Trenton 2, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

WIRE (Barb)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria 7, Ill.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.

WIRE (Bead, Braid & Tubes)

National-Standard Co., Niles, Mich.

WIRE (Brass, Bronze, Phosphor Bronze, Silicon Bronze, Copper or Nickel Silver)

American Brass Co., The, Waterbury 88, Conn.
Bridgeport Brass Co., Bridgeport 2, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Riverside Metal Co., The, Riverside, N. J.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Seymour Manufacturing Co., The, 51 Franklin St., Seymour, Conn.

WIRE (Cold Drawn)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Keystone Steel & Wire Co., Peoria 7, Ill.
National-Standard Co., Niles, Mich.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's John A., Sons Co., Trenton 2, N. J.
Seneca Wire Mfg. Co., The, Fostoria, O.
Washburn Wire Co., 118th St., & Harlem River, New York 35, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.

WIRE (High Carbon)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.

Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Keystone Steel & Wire Co., Peoria 7, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
National-Standard Co., Niles, Mich.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's John A., Sons Co., Trenton 2, N. J.
Seneca Wire & Mfg. Co., The Fostoria, O.
Union Wire Rope Corp., 21st St., & Manchester Ave., Kansas City 3, Mo.
Washburn Wire Co., 118th St. and Harlem River, New York 35, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

WIRE (Magnet)

Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

WIRE (Music)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Roebling's John A., Sons Co., Trenton 2, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York 35, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.

WIRE (Round, Flat, Square, Special Shapes)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Athenia Steel Co., Clifton, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Keystone Steel & Wire Co., Peoria 7, Ill.
National-Standard Co., Niles, Mich.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.
Roebling's John A., Sons Co., Trenton 2, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Washburn Wire Co., 118th & Harlem River, New York 35, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.
Youngstown Sheet & Tube Co., The, Youngstown 1, O.

WIRE (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Keystone Steel & Wire Co., Peoria 7, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's John A., Sons Co., Trenton 2, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Union Wire Rope Corp., 21st and Manchester Ave., Kansas City 3, Mo.
Washburn Wire Co., 118th St. & Harlem River, New York 35, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.
Youngstown Sheet & Tube Co., Youngstown 1, O.

WIRE (Stapling)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria 7, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Menessen, Pa.
Roebling's John A., Sons Co., Trenton 2, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.
Worcester Wire Works, Worcester, Mass.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.
Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.
Roebling's John A., Sons Co., Trenton 2, N. J.

WIRE CLOTH

Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Roebling's John A., Sons Co., Trenton 2, N. J.
Rolock, Inc., 1380 Kings Highway, Fairfield, Conn.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

WIRE COILING TOOLS (Cemented Carbide)

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kennametal, Inc., Latrobe, Pa.

WIRE FORMS, SHAPES AND SPECIALTIES

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago 24, Ill.
American Chain Div. American Chain & Cable Co., Inc., York, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.
Keystone Steel & Wire Co., Peoria 7, Ill.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.
Wickwire Spencer Steel Div., The, Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

WIRE FORMING MACHINERY

Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Wean Engineering Co., Inc., The, Warren, O.

WIRE FORMS, SHAPES & SPECIALTIES

Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, O.

WIRE MILL EQUIPMENT

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, Ohio.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland 4, O.
Morgan Construction Co., Worcester 5, Mass.
Shuster, F. B., Mfg. Co., Inc., The, New Haven 9, Conn.
Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Keystone Steel & Wire Co., Peoria 7, Ill.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland 4, O.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Tennessee Coal Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.
Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.
Wickwire Spencer Steel Div., The, Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

WIRE ROPE

American Cable Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco 6, Calif.
Craine-Schrage Steel Co., 1025 S. Oakwood Ave., Detroit 25, Mich.
Hazard Wire Rope Div. of American Chain & Cable Co. Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Union Wire Rope Corp., 21st and Manchester Ave., Kansas City 3, Mo.
Wickwire Spencer Steel Div., The, Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

WIRE ROPE FITTINGS

American Cable Div. of American Chain & Cable Co., Wilkes-Barre, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Hazard Wire Rope Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Leschen, A., & Sons, Rope Co., 5909 Kennerly Ave., St. Louis 12, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton 2, N. J.

WIRE ROPE SLINGS

American Cable Div. American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.
Bethlehem Steel Co., Bethlehem, Pa.
Hazard Wire Rope Div., American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton 2, N. J.
Union Wire Rope Corp., 21st & Manchester Ave., Kansas City 3, Mo.
Wickwire Spencer Steel Div., The, Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

WIRE STRAIGHTENING AND CUTTING MACHINERY

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh 30, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland 4, O.
Shuster, F. B., Mfg. Co., Inc., New Haven 9, Conn.

WORK REST BLADES (Centerless Grinder)

Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

WRENCHES (Adjustable)

Knu-Vise Products Co., 2200 8th Ave., Detroit 16, Mich.

WRENCHES (Drop Forged)

Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

WRENCHES (Torque)

Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

X-RAY EQUIPMENT and SUPPLIES

Eastman Kodak Co., 343 State St., Rochester 4, N. Y.
General Electric X-Ray Corp., 175 W. Jackson Blvd., Chicago 4, Ill.
Westinghouse Electric Corp., Baltimore 3, Md.

ZINC

New Jersey Zinc Co., The, 160 Front St., New York 7, N. Y.

ZINC ALLOYS

New Jersey Zinc Co., The, 160 Front St., New York 7, N. Y.

ZINC OXIDE

Anaconda Sales Company, 25 Broadway, New York 4, N. Y.
New Jersey Zinc Co., The, 160 Front St., New York 7, N. Y.

ZINC (Rolled Sheets, Strip, Coils)

New Jersey Zinc Co., 160 Front St., New York 7, N. Y.

ZINC SLABS

Anaconda Sales Company, 25 Broadway, New York 4, N. Y.
New Jersey Zinc Co., The, 160 Front St., New York 7, N. Y.

ZIRCONIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.

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A

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago 24, Ill.

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Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown 1, O.

Agerstrand Corp., Muskegon, Mich.

Air Reduction, 60 E. 42nd St., New York 17, N. Y.

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

Alan Wood Steel Co., Conshohocken, Pa.

Albert, L., & Son, Whitehead Rd., Trenton, N. J.

Alemite Div., Stewart-Warner Corp., 1828 W. Diversey Pkwy., Chicago 14, Ill.

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa. (Brackenridge, Pa.)

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

Alliance Machine Co., The, Alliance, O.

Allied Products Corp., Dept. 29E, 4628 Lawton Ave., Detroit 8, Mich.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Alloy Metal Abrasive Co., 811 W. Huron St., Ann Arbor, Mich.

Alloy Rods Co., York, Pa.

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.

Aluminum Co. of America, Chemicals Div., Oliver Bldg. Pittsburgh 22, Pa.

Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O.

American Air Filter Co., Inc., 443 Central Ave., Louisville 8, Ky.

American Blower Corp., 8111 Tireman Ave., Detroit 4, Mich.

American Brass Co., The, Waterbury 88, Conn.

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.

American Broach & Machine Co., Ann Arbor, Mich.

American Chain & Cable Co., Inc., Bridgeport 2, Conn.

American Chemical Paint Co., Ambler, Pa.

American Crayon Co., Sandusky, O.

American Gas Association (Industrial Gas Section) 420 Lexington Ave., New York 17, N. Y.

American Gas Furnace Co., Lafayette & Spring Sts., Elizabeth, N. J.

American Hoist & Derrick Co., St. Paul 1, Minn.

American Hot Dip Galvanizers' Association, 1611 First National Bank Bldg., Pittsburgh 22, Pa.

American Institute of Bolt, Nut & Rivet Manufacturers, 1550 Hanna Bldg., Cleveland 15, O.

American Magnesium Corp., 1721 Gulf Bldg., Pittsburgh 19, Pa.

American Metal Hose Branch of the American Brass Co., Waterbury 88, Conn.

American MonoRail Co., The, 13102 Athens Ave., Cleveland 7, O.

American Petrometal Corp., Broadway at 11th St., Long Island City 2, N. Y.

American Pulley Co., The 4200 Wissahickon Ave., Philadelphia 29, Pa.

American Pulverizer Co., 1539 Macklind Ave., St. Louis 10, Mo.

American Roller Bearing Co., 420 Melwood St., Pittsburgh 13, Pa.

American Rolling Mill Co., The Rustless Iron & Steel Div., 3400 E. Chase St., Baltimore 13, Md.

American Rolling Mill Co., The, 3701 Curtis St., Middletown, O.

American Screw Co., Providence 1, R. I.

American Shear Knife Co., P. O. Box 355, Homestead, Pa.

American Solder & Flux Co., 2153 E. Norris St., Philadelphia 25, Pa.

American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka, Ind.

Ampco Metal Inc., Dept. S8, Milwaukee 4, Wis.

Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh 22, Pa.

Arcos Corp., 318 Gulf Bldg., Philadelphia 2, Pa.

Armour & Co., Sandpaper Div., 1355 W. 31st St., Chicago 9, Ill.

Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.

Associated Engineers, Inc., 230 E. Berry St., Fort Wayne 2, Ind.

Atlantic Steel Products Co., 1330 N. 30th St., Philadelphia 21, Pa.

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland 10, O.

Atlas Drop Forge Co., Lansing 2, Mich.

Atlas Tool & Designing Co., Castor & Kensington Aves., Philadelphia 24, Pa.

Automatic Sprinkler Corp., of America, Brittain St., Youngstown 8, O.

Avondale Marine Ways, Inc., Westwago, La.

B

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York 6, N. Y.

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh 22, Pa.

Baker, J. E., Co., The, 114 N. George St., York, Pa.

Baker-Raulang Co., The, 2167 W. 25th St., Cleveland 13, O.

Baldt Anchor, Chain & Forge Div., of The Boston Metals Co., Chester, Pa.

Baldwin Southwark Div., Baldwin Locomotive Works, The, Paschall P. O., Phila. 42, Pa.

Bantam Bearings Div., Torrington Co., The, South Bend 21, Ind.

Barber-Colman Co., 150 Loomis St., Rockford, Ill.

Barnes, Wallace Co., The, 97 Main St., Bristol, Conn.

Bartlett, C. O., & Snow Co., The, 6200 Harvard Ave., Cleveland 5, O.

Basic Refractories, Inc., Hanna Bldg., Cleveland 15, O.

Bay City Forge Co., W. 19th & Cranberry Sts., Erie, Pa.

Bay State Abrasive Products Co., Union St., Westboro, Mass.

Beal Tool Div. (Hubbard & Co.) 110 Shamrock St., East Alton, Ill.

Bearings Co. of America, Lancaster, Pa.

Beatty Machine & Mfg. Co., 150th & Oak Sts., Hammond, Ind.

Bedford Fdry. & Machine Co., Bedford, Ind.

Bell Engineering Co., The, 2020 Chapman Highway, Knoxville 15, Tenn.

Bellows Senacon Co., The, 798 N. Main St., Akron 10, O.

Belmont Iron Works, 22nd St. & Washington Ave., Philadelphia 46, Pa.

Bethlehem Steel Co., Bethlehem, Pa.

Better Finishes & Coatings Inc., 268 Doremus Ave., Newark 5, N. J.

Beverley Shear Co., 3004 W. 111th St., Chicago 43, Ill.

Bigwood, Joshua, & Son, Ltd., Wolverhampton, England.

Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.

Blanchard Machine Co., The, 64 State St., Cambridge 39, Mass.

Blaw-Knox Co., Blawnox, Pa.

Bliss, E. W., Co., 450 Amsterdam St., Detroit 2, Mich.

Bliss & Laughlin, Inc., Harvey, Ill.

Boston Woven Hose & Rubber Co., P. O. Box 1071, Boston 3, Mass.

Brandt, Charles T., Inc., 1700 Ridgely St., Baltimore 30, Md.

Bridgeport Brass Co., Bridgeport 2, Conn.

Bridgeport Safety Emery Wheel Co., Inc., The, P. O. Box 2031 Stratford, Bridgeport, Conn.

Bridgewater Screw Products Co., Bridgewater, Mass.

Bristol Co., The, Waterbury 91, Conn.

Brooke, E. & G., Iron Co., Birdsboro, Pa.

Brooks Oil Co., 315 E. Carson St., Pittsburgh 19, Pa.

Brosius, Edgar E., Co., Sharpsburg P. O., Pittsburgh 15, Pa.

Brown-Brockmeyer Co., The, P. O. Box 976, Dayton 1, O.

Brown & Sharpe Mfg. Co., Providence 1, R. I.

Browning Crane & Shovel Co., 16226 Waterloo Rd., Cleveland 10, Ohio.

Browning, Victor R., Co., Inc., Willoughby, O.

Brush Development Co., The, 3405 Perkins Ave., Cleveland 14, O.

Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.

Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago 6, Ill.

Budd Co., The, 25th St. & Hunting Park Ave., Philadelphia 32, Pa.

Buffalo Bolt Co., 101 East Ave., N. Tonawanda, N. Y.

Buffalo Forge Co., 158 Mortimer St., Buffalo 5, N. Y.

Bullard Co., The, Bridgeport 2, Conn.

Bundy Tubing Co., 8109 E. Jefferson Ave., Detroit 14, Mich.

Bunting Brass & Bronze Co., The, Toledo 9, O.

Burt Manufacturing Co., The, 400 S. High St., Akron 11, O.

C

Cadman, A. W., Mfg. Co., 28th & Smallman Sts., Pittsburgh 22, Pa.

Caine Steel Co., 1820 N. Central Ave., Chicago 39, Ill.

Calumet & Hecla Consolidated Copper Co., Wolverine Tube Div., 1439 Central Ave., Detroit 9, Mich.

Carboloy Co., Inc., 11141 E. 8 Mile Ave., Detroit 32, Mich.

Carborundum Co., The, Buffalo & 18th Sts., Niagara Falls, N. Y.

Cardox Corp., Bell Bldg., Chicago 1, Ill.

Carnegie-Illinois Steel Corp., 327 Carnegie Bldg., Pittsburgh 30, Pa.

Carpenter Steel Co., 139 W. Bern St., Reading, Pa.

Cattie, Jos. P., & Bros., Gaul & Letterly Sts., Philadelphia 25, Pa.

Ceilcote Co., 750 Rockefeller Bldg., Cleveland 13, O.

Central Foundry Div., General Motors Corp., Saginaw, Mich.

Central Scientific Co., 1700 Irving Park Rd., Chicago 13, Ill.

Century Electric Co., 1806 Pine St., St. Louis 3, Mo.

Chambersburg Engineering Co., Chambersburg, Pa.

Champion Rivet Co., The, 11200 Harvard Ave., Cleveland 5, O.

Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

Chicago Peforating Co., 2443 W. 24th Pl., Chicago 8, Ill.

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago 22, Ill.

Chisholm-Moore Hoist Corp., 118 Fremont Ave., Tonawanda, N. Y.

Cimcool Div., Cincinnati Milling Machine Co., Cincinnati 9, O.

Cincinnati Bickford Tool Co., The, 3220 Forrer Ave., Cincinnati 9, O.

Cincinnati Milling Machine Co. and Cincinnati Grinders, Inc., Oakley Station, Cincinnati 9, O.

Cincinnati Shaper Co., The, Hopple, Garrard & Elam Sts., Cincinnati 25, O.

Cities Service Companies, 60 Wall Tower, New York 5, N. Y.

Clark Controller Co., The, 1146 E. 152nd St., Cleveland 10, O.

Clark Equipment Co., Buchanan, Mich.

Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.

Cleveland Automatic Machine Co., The, 2269 Ashland Rd., Cleveland 3, O.

Cleveland Chain & Mfg. Co., The, Broadway & Henry Rd., Cleveland 5, O.

Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland 14, O.

Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.

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Cleveland Tramrail Div., 1125 E. 283rd St., Wickliffe, O.

Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland 14, O.

Cleveland Wire Spring Co., The, 2012 W. 25th St., Cleveland 13, O.

Cleveland Worm & Gear Co., The, 3270 E. 80th St., Cleveland 4, O.

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.

Clinton Bridge Works 101 S. Second St., Clinton, Iowa.

Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown 1, O.

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Continental Steel Corp., Kokomo, Ind.

Cooper-Bessemer Corp., The, Mt. Vernon, O.

Copperweld Steel Co., Warren, O.

Cowles Tool Co., 2086 W. 110th St., Cleveland 2, O.

Crucible Steel Casting Co., Lansdowne, Del. Co., Pa.

Crucible Steel Co. of America, Dept. H-1, 405 Lexington Ave., New York 17, N. Y.

Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago 23, Ill.

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh 19, Pa.

Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis 20, Mo.

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Cuyahoga Spring Co., 10254 Berea Rd., Cleveland 2, O.

D

Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50, Ill.

Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.

Davenport Besler Corp., Davenport, Iowa

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Dempster Brothers, Inc., Knoxville 17, Tenn.

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Detrex Corporation, Detroit 32, Mich.

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Detroit Power Screwdriver Co., 2813 W. Fort St., Detroit 16, Mich.

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Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.

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Dewey & Almy Chemical Co., Cambridge 40, Mass.

Diamond Mfg. Co., Box 32, Wyoming, Pa.

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Differential Steel Car Co., Findlay, O.

Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia 35, Pa.

Dodge Mfg. Corp., Mishawaka, Ind.

du Pont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.

E

Eastern Stainless Steel Corp., 122 Rolling Mill Ave., Baltimore 3, Md.

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Eaton Manufacturing Co., Foundry Div., 9771 French Rd., Detroit 13, Mich.

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Economy Co., Inc., 49 Vanderbilt Ave., New York 17, N. Y.

Elastic Stop Nut Corp., 115 Broadway, New York 6, N. Y.

Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland 4, O.

Electric Furnace Co., The, Salem, O.

Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia 32, Pa.

Electro Metallurgical Co., 30 E. 42nd St., New York 17, N. Y.

Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.

Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland 14, O.

Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia 25, Pa.

Erdle Perforating Co., 171 York St., Rochester 11, N. Y.

Erie Foundry Co., Erie, Pa.

Erie Steel Construction Co., 961 Geist Rd., Erie, Pa.

Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.

Eureka Fire Brick Works, 1100 B. F. Jones Law Bldg., Pittsburgh 19, Pa.

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F

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Federal Machine & Welder Co., 202 Dana St., Warren, O.

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Fitchburg Grinding Machine Corp. Fitchburg, Mass.

Fitzsimons Co., The, Youngstown 8, O.

Follansbee Steel Corp., Pittsburgh 30, Pa.

Foote, Brad, Gear Works, 1309 S. Cicero Ave., Cicero 50, Ill.

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Foote-Burt Co., The, Cleveland 8, O.

Fort Pitt Bridge Works, Keystone Hotel, Pittsburgh 22, Pa.

Foster, Frank B., 829 Oliver Bldg., Pittsburgh 22, Pa.

Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh 30, Pa.

Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.

French & Hecht Inc., 525 E. 3rd St., Davenport, Ia

Furnace Engineers, Inc., 1551 W. Liberty Ave. Pittsburgh 26, Pa.

G

Gage Structural Steel Co., 3123-41 S. Hayne Ave., Chicago 8, Ill.

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Gas Machinery Co., The, 16100 Waterloo Rd., Cleveland 10, O.

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General Chemical Co., 40 Rector St., New York 6, N. Y.

General Electric Co., Schenectady 5, N. Y.

General Electric X-Ray Corp., 175 W. Jackson Blvd., Chicago 4, Ill.

General Engineering & Mfg. Co., 1523 S. 10th St., St. Louis 4, Mo.

General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago 39, Ill.

Gerding Bros., 5 E. Third St., Cincinnati 2, O.

Gisholt Machine Co., 1217 E. Washington Ave., Madison 3, Wis.

Gits Brothers Mfg. Co., 1836 S. Kilbourn Ave., Chicago 23, Ill.

Globe Brick Co., The, East Liverpool, O.

Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.

Goodrich, B. F. Co., The, Akron 18, O.

Gordon, Claud S., Co., 3000 S. Wallace St., Chicago 16, Ill.

Granite City Steel Co., Granite City, Ill.

Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y.

Grant Gear Works, 2nd & B Sts., Boston 27, Mass.

Great Lakes Steel Corp., Tecumseh Rd., Detroit 18, Mich.

Greenfield Tap & Die Corp., Greenfield, Mass.

Greenlee Brothers & Co., 1927 Mason Ave., Rockford, Ill.

Greenspon's, Jos., Son Pipe Corp., National Stock Yards, St. Clair County, Ill.

Greenville Steel Car Co., Greenville, Pa.

Gruendler Crusher & Pulverizer Co., 2915-17 N. Market St., St. Louis 6, Mo.

Guibert Steel Co., P. O. Box 1837, Pittsburgh 30, Pa.

Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.

H

Hagan George J., Co., 2400 E. Carson St., Pittsburgh 3, Pa.

Hallden Machine Co., The, Thomaston, Conn.

Handy & Harman, 82 Fulton St., New York 7, N. Y.

Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh 1, Pa.

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Hanson-Van Winkle-Munning Co., Matawan, N. J.

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.

Harper, H. M., Co., The, 2646 Fletcher St., Chicago 18, Ill.

Harrington & King Perforating Co., The, 5634 Fillmore St., Chicago 44, Ill.

Harrisburg Steel Corp., Harrisburg, Pa.

Haskelite Mfg. Corp., Grand Rapids 2, Mich.

Hassall, John, Inc., 402 Oakland St., Brooklyn 22, N. Y.

Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.

Hazard Wire Rope Div., American Chain & Cable Co., Inc., Wilkes-Barre, Pa.

Heald Machine Co., The, Worcester 6, Mass.

Heil Process Equipment Co., 12903 Elmwood Ave., Cleveland 11, O.

Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.

Heppenstall Co., Dept. T.P., 4620 Hatfield St., Pittsburgh 1, Pa.

Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee 1, Wis.

Hewitt Rubber of Buffalo, 240 Kensington Ave., Buffalo 5, N. Y.

Hindley Mfg. Co., Valley Falls, R. I.

Hobart Bros. Co., The, Box ST 172, Troy, O.

Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.

Holden, A. F., Co., The, P. O. Box 1898, New Haven 8, Conn.

Holliday, W. J., & Co., Hammond, Ind.

Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.

Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland 14, O.

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Hubbard, M. D., Spring Co., 425 Central Ave., Pontiac 12, Mich.,

Hughes-Keenan Co., The, 585 Newman St., Mansfield, O.

Huther Bros. Saw Mfg. Co., Inc., 1290 University Ave., Rochester, N. Y.

Hyatt Bearings Div., General Motors Corp., Harrison, N. J.

Hyde Park Fdry. & Machine Co., Hyde Park, Pa.

Hydraulic Press Mfg. Co., The, Mt. Gilead, O.

Hydropress, Inc. 570 Lexington Ave., New York 22, N. Y.

Hy-Test Div., International Shoe Co., 1509 Washington Ave., St. Louis 3, Mo.

I

Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

Independent Engineering Co., 105 W. Second St., O'Fallon, Ill.

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.

Industrial Brownhoist Corp., Bay City, Mich.

Industrial Gear Mfg. Co., 4545 E. Van Buren St., Chicago 24, Ill.

Industrial Ovens Inc., 13825 Triskett Rd., Cleveland 11, O.

Ingalls Iron Works Co., The, Birmingham 2, Ala.

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.

Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.

International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.

International Graphite & Electrode Corp., St. Marys, Pa.

International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.

International Rustproof Corp., 12507-15 Plover Ave., Cleveland 7, O.

Iron & Steel Products, Inc., Hegewisch Sta., Chicago 33, Ill.

Irwin Mfg. Co., Inc., Garland, Pa.

J

Jack & Heintz Precision Industries, Inc., Cleveland 1, O.

Jackson Drop Forge Co., Jackson, Mich.

Jackson Iron & Steel Co., Jackson, O.

James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.

Jeffrey Mfg. Co., The, 889-99 N. Fourth St., Columbus 16, O.

Jessop Steel Co., 584 Green St., Washington, Pa.

Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.

Johnson Gas Appliance Co., 573 "E" Ave., N.W., Cedar Rapids, Iowa.

Johnson Steel & Wire Co., Inc., Worcester 1, Mass.

Jones & Lamson Machine Co., Springfield, Vt.

Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh 30, Pa.

Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago 24, Ill.

K

Kardong Brothers, Inc., 346 Buchanan St., Minneapolis 13, Minn.

Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

Kelley, J. W., Co., The, 3401 W. 140th St., Cleveland 11, O.

Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.

Kennametal, Inc., Latrobe, Pa.

Keokuk Electro-Metals Co., Keokuk, Ia.

Kerr Manufacturing Co., 6081-94 Twelfth St., Detroit 8, Mich.

Kester Solder Co., 4222 Wrightwood Ave., Chicago 39, Ill.

Keystone Abrasive Wheel Inc., Carnegie, Pa.

Keystone Steel & Wire Co., Peoria 7, Ill.

Kinnear Mfg. Co., The, 1780-1800 Fields Ave., Columbus 16, O.

Kloster Steel Corp., 224 N. Justine St., Chicago 7, Ill.

Knu-Vise Products Co., 2200 8th Ave., Detroit 16, Mich.

Kondor Products Corp., West Clifton Blvd. at Sloan, Cleveland 7, O.

Koppers Co., Koppers Bldg., Pittsburgh 19, Pa.

Korfund Co., The, Inc., 48-37 Thirty Second Place, Long Island City 1, N. Y.

Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.

L

Laclede Steel Co., Arcade Bldg., St. Louis, Mo.

Ladish Co., Cudahy, Wis.

Lake City Malleable Co., The, 5026 Lakeside Ave., Cleveland 14, O.

Laminated Shim Co., Inc., 87 Union St., Glenbrook, Conn.

Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland 2, Ohio.

Landis Machine Co., Waynesboro, Pa.

Landis Tool Co. Waynesboro, Pa.

Lansing Engineering Co., 934-36 Clark St., Lansing 6, Mich.

Latrobe Electric Steel Co., Latrobe, Pa.

Layne & Bowler, Inc., Memphis 8, Tenn.

Lebanon Steel Foundry, Lebanon, Pa.

LeBlond, R. K., Machine Tool Co., The, Cincinnati 8, O.

Lee Spring Co., Inc., 30 Main St., Brooklyn 1, N. Y.

Lepel High Frequency Laboratories Inc., 39 W. 60th St., New York 23, N. Y.

Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12, Mo.

Lester-Phoenix, Inc., 2629 Church Ave., Cleveland 13, O.

Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh 19, Pa.

Lewis Fdry. & Machine Div. of Blaw-Knox Co., P. O. Box 1586, Pittsburgh 30, Pa.

Lewis Machine Co., 3450 E. 76th St., Cleveland 4, O.

Lewthwaite, T. H., Machine Co., 311 E. 47th St., New York 17, N. Y.

Lincoln Electric Co., The, Cleveland 1, O.

Linde Air Products Co., The, 30 E. 42nd St., New York 17, N. Y.

Lisbon Hoist & Crane Co., Lisbon, O.

Littell, F. J., Machine Co., 4165 N. Ravenswood Ave., Chicago 13, Ill.

Lodge & Shipley Machine Tool Co., The, 3055 Colerain Ave., Cincinnati 25, O.

Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.

Logan Co., Inc., 536 Cabel St., Louisville 6, Ky.

Logemann Brothers Co., 3126 Burleigh St., Milwaukee 10, Wis.

Lovejoy Flexible Coupling Co., 5071 W. Lake St., Chicago 44, Ill.

Lumnite Div. Universal Atlas Cement Co., Dept. S, Chrysler Bldg., New York 17, N. Y.

Mc

McGill Mfg. Co., Inc., Valparaiso, Ind.

McGraw, F. H., Co., 51 E. 42nd St., New York 17, N. Y.

McKay Machine Co., The, 546 W. Rayen St., Youngstown 2, O.

McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland 1, O.

M

McLouth Steel Corp., 300 S. Livernois Ave., Detroit, Mich.

Mackintosh-Hemphill Co., 9th & Bingham St., Pittsburgh 3, Pa.

Macwhyte Company, 2912 14th Ave., Kenosha, Wis.

Maehler, Paul Co., The, 2208 W. Lake St., Chicago 12, Ill.

Mahon, R. C., Co., The, 8650 Mt. Elliott Ave., Detroit 11, Mich.

Manheim Mfg. & Belting Co., Manheim, Pa.

Mansaver Industries Inc., 3101 East St., New Haven 3, Conn.

Marchant, George F. Co., 1420 S. Rockwell St., Chicago 8, Ill.

Markal Co., 631 N. Western Ave., Chicago 12, Ill.

Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.

Master Builders Co., The, 7016 Euclid Ave., Cleveland 3, O.

Master Electric Co., The, 100 Davis Ave., Dayton 1, O.

Master Products Co., The, 6400 Park Ave., Cleveland 5, O.

Mathews Conveyer Co., Ellwood City, Pa.

Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh 13, Pa.

Mattison Machine Works, Rockford, Ill.

Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit 12, Mich.

Medart Co., The, 3500 DeKalb St., St. Louis 18, Mo.

Merz Engineering Co., Indianapolis 7, Ind.

Mesta Machine Co., P. O. Box 1466, Pittsburgh 30, Pa.

Metal & Thermit Corp., 120 Broadway, New York 5, N. Y.

Metallizing Co. of America, 1330 W. Congress St., Chicago 7, Ill.

Michiana Products Corp., Michigan Ciy, Ind.

Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit 12, Mich.

Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4, Mich.

Midland Structural Steel Co., 1300-20 S. 54th Ave., Cicero 50, Ill.

Midvale Co., The, Nicetown, Philadelphia 40, Pa.

Midwest Steel Corp., Charleston, W. Va.

Modern Engineering Co., Inc., 3400 Pine St., St. Louis 3, Mo.

Moline Tool Co., 102 20th St., Moline, Ill.

Moltrup Steel Products Co., Beaver Falls, Pa.

Molybdenum Corp. of America, Grant Bldg., Pittsburgh 19, Pa.

Monarch Machine Tool Co., The, Sidney, O.

Monarch Steel Co., 545 W. McCarty St., Indianapolis 7, Ind.

Morgan Construction Co., Worcester 5, Mass.

Morgan Engineering Co., The, Alliance, O.

Morse Chain Co., Ithaca, N. Y.

Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, O.

N

National Acme Co., The, 170 E. 131st St., Cleveland 8, O.

National Annealing Box Co., Washington, Pa.

National Automatic Tool Co. Inc., S. 7th & N Sts., Richmond, Ind.

National Bearing Div., American Brake Shoes Co., 4930 Manchester Ave., St. Louis 10, Mo.

National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y.

National City Bank, Euclid Ave. & E. 6th St., Cleveland 14, O.

National Cylinder Gas Co. 205 W. Wacker Dr., Chicago 6, Ill.

National Erie Corp., Erie, Pa.

National Forge & Ordnance Co., Irvine, Warren Co., Pa.

National Lead Co., 111 Broadway, New York 6, N. Y.

National Machinery Co., The, Tiffin, O.

National Roll & Machine Co., 954 Ansel Rd., Cleveland 3, O.

National Screw & Mfg. Co., The 2440 E. 75th St., Cleveland 4, O.

National-Standard Co., Niles, Mich.

National Steel Corp., Grant Bldg., Pittsburgh 19, Pa.

National Tool Co., The, 11200 Madison Ave., Cleveland 2, O.

National Tube Co., Frick Bldg., Pittsburgh 30, Pa.

New Britain Machine Co., New Britain, Conn.

New Departure Div., General Motors Corp., Bristol, Conn.

New Jersey Zinc Co., The, 160 Front St., New York 7, N. Y.

New York & New Jersey Lubricant Co., 292 Madison Ave., New York 17, N. Y.

Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y.

Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.

Northwest Engineering Co., 28 W. Jackson Blvd., Chicago 4, Ill.

Northwest Steel Rolling Mills, 4315 Ninth Ave., Seattle, Wash.

Norton Co., Worcester 6, Mass.

O

Oakite Products, Inc., 34E Thames St., New York 6, N. Y.

Ohio Crankshaft Co., The, 3800 Harvard Ave., Cleveland 1, O.

Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland 4, O.

Ohio Ferro Alloys Corp., Citizens Bldg., Canton 2, O.

Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

Ohio Locomotive Crane Co., Bucyrus, O.

Ohio Seamless Tube Co., The, Shelby, O.

Ohio Steel Foundry Co., Lima & Springfield, O.

O'Neil-Irwin Mfg. Co., 304 8th Ave. S., Lake City 15, Minn.

Osgood Co., The, Marion, O.

Ottumwa Iron Works, Ottumwa, Ia.

Owen Bucket Co., 6013 Breakwater Ave., Cleveland 2, O.

Ozalid Products Div. General Aniline & Film Corp., Johnson City, N. Y.

P

Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.

Pangborn Corporation, Hagerstown, Md.

Parker Appliance Co., The, 17325 Euclid Ave., Cleveland 12, O.

Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.

Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit 11, Mich.

Pawtucket Mfg. Co., 327 Pine St., Pawtucket, R. I.

Paxson Machine Co., Benton Rd., Salem, O.

Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.

Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, Mich.

Penn Tool & Machine Co., Danville, Ill.

Penflex Sales Co., Div. of Pennsylvania Flexible Metallic Tubing Co., 7250 Powers Lane, Philadelphia 42, Pa.

Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

Penola, Inc., 221 North La Salle St., Chicago 1, Ill.

Perkins, B. F., & Son, Inc., Holyoke, Mass.

Pesco Products Co., 11610 Euclid Ave., Cleveland 6, O.

Philadelphia Gear Works Inc., Erie Ave. & G St., Philadelphia 34, Pa.

Philco Corp. Storage Battery Div., 467 Calhoun St., Trenton 7, N. J.

Phillips Screw Manufacturers, Providence 1, R. I.

Pickands Mather & Company, Union Commerce Bldg., Cleveland 14, O.

Pittsburgh Commercial Heat Treating Co., 49th St. & A. V. R. R., Pittsburgh 1, Pa.

Pittsburgh-Crucible Div., Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa.

Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh 1, Pa.

Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh 22, Pa.

Pittsburgh Lectrodryer Corp., P. O. Box 1766, Pittsburgh, Pa.

Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh 30, Pa.

Pittsburgh Plate Glass Co., Brush Div., 3221 Frederick Ave., Baltimore 29, Md.

Pittsburgh Plate Glass Co., Paint Div., 632 Duquesne Way, Pittsburgh 22, Pa.

Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh 1, Pa.

Pittsburgh Steel Foundry Corp., Glassport, Pa.

Plasteel Products Co., Washington, Pa.

Plymouth Locomotive Works, Fate-Root-Heath Co., Plymouth, O.

Pollock, William B., Co., The, 101 Andrews Ave., Youngstown 1, O.

Poole Fdry. & Machine Co., Woodberry, Baltimore 11, Md.

Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh 1, Pa.

Potter & Johnston Machine Co., 1027 Newport Ave., Pawtucket, R. I.

Precision Scientific Co., 3737 Cortland St., Chicago 47, Ill.

Pressed Steel Car Co., Inc., Grant Bldg., Pittsburgh 19, Pa.

Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.

Propulsion Engine Corp., 7th & White Eagle Rd., Kansas City, Kans.

R

R-S Products Corp., Philadelphia 44, Pa.

Rail & Industrial Equipment Co., 30 Church St., New York 7, N. Y.

Ransohoff, N., Inc., 1317 Township Ave., Cincinnati 16, O.

Rapids-Standard Co., Inc., The, Peoples Nat'l Bank Bldg., Grand Rapids 2, Mich.

Rathborne, Hair & Ridgway Co., 1440 W. 21st Pl., Chicago 8, Ill.

Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.

Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.

Ready-Power Co., The, 3824 Grand River Ave., Detroit 8, Mich.

Reid-Avery Co., The, Cleveland & Chesapeake Sts., Baltimore 22, Md.

Reid Brothers Co., Inc., 140 Elliott St., Beverly, Mass.

Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O.

Reliance Steel Div. Detroit Steel Corp., 1025 S. Oakwood Ave., Detroit 25, Mich.

Remington Rand Inc., Systems Div., 315 Fourth Ave., New York 10, N. Y.

Republic Steel Corp., Dept. ST, Cleveland 4, O.

Revere Copper & Brass Inc., 230 Park Ave., New York 17, N. Y.

Reynolds Metals Co., 2520 S. Third St., Louisville 1, Ky.

Rheem Research Products, Inc., 1403 Standard Oil Bldg., St. Paul & Franklin Sts., Baltimore 2, Md.

Rhoades, R. W., Metaline Co., Inc., 50-17 Fifth St., Long Island City 1, N. Y.

Riverside Metal Co., The, Riverside, N. J.

Robins Conveyors, Inc., Div. of Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Robinson Clay Products Co., The, 1100 Second National Bank Bldg., Akron 8, O.

Rockford Machine Tool Co., 2400 Kishwaukee St., Rockford, Ill.

Roebling's John A., Sons Co., Trenton 2, N. J.

Rollway Bearing Co., Inc., 541 Seymour St., Syracuse 4, N. Y.

Rolock, Inc., 1380 Kings Highway, Fairfield, Conn.

Roots-Connersville Blower Corp., Connersville, Ind.

Ross Carrier Corp., Benton Harbor, Mich.

Ross Heater & Mfg. Co. Inc., 1431 West Ave., Buffalo 13, N. Y.

Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee 12, Wis.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 80, Ill.

S

S K F Industries, Inc., Philadelphia 32, Pa. Philadelphia 34, Pa.

Salem Engineering Co., 714 S. Broadway, Salem, O.

Samuel, Frank, & Co. Inc., Harrison Bldg., Philadelhpia 2, Pa.

Sanstorm Mfg. Co., Santa Clara & H. Sts., Fresno, Cal.

Saunders, Alexander, & Co., 95 Bedford St., New York 14, N. Y.

Schneible, Claude B., Co., 2827 25th St., Detroit 16, Mich.

Scott Aviation Corp., Lancaster, N. Y.

Scovill Mfg. Co., 20 Mill St., Waterbury 91, Conn.

Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

Selas Corp. of America, 18th & Indiana Sts., Philadelphia 32, Pa.

Seneca Wire & Mfg. Co., The, Fostoria, O.

Seymour Mfg. Co., The, 51 Franklin St., Seymour, Conn.

Shafer Bearing Corp., Chicago 7, Ill.

Sharon Steel Corp., Sharon, Pa.

Shawinigan Products Corp., Empire State Bldg., New York 1, N. Y.

Sheffield Corp., The, 721 Springfield St., Dayton 1, O.

Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh 22, Pa.

Shenango-Penn Mold Co., Bronze Dept. 461 W. Third St., Dover, O.

Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

Shor, I., Co., 68 W. 48th St., New York 2, N. Y.

Shuster, F. B., Mfg. Co., Inc., The, New Haven 9, Conn.

Siefen, J. J., Co., 5657 Lauderdale Ave., Detroit 9, Mich.

Silent Hoist & Crane Co., 849 63rd St., Brooklyn 20, N. Y.

Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh 22, Pa.

Simonds Saw & Steel Co., 1350 Columbia Rd., Boston 27, Mass.

Sinclair Refining Co., 630 Fifth Ave., New York 20, N. Y.

Smeeth-Harwood Co., 2401-09 W. Cermak Rd., Chicago 8, Ill.

Smith, A. O., Corp., 3533 N. 27th St., Milwaukee 1, Wis.

Snyder, W. P., & Co., Oliver Bldg., Pittsburgh 22, Pa.

Socony-Vacuum Oil Co. Inc., 26 Broadway, New York 4, N. Y.

Sommer & Adams Co., 18511 Euclid Ave., Cleveland 13, O.

South Bend Lathe Works, 429 Madison St., South Bend 22, Ind.

Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga 2, Tenn.

Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.

Standard Conveyor Co., 135 Second Ave., N. St. Paul 9, Minn.

Standard Machinery Co., 1475 Elmwood Ave., Providence 7, R. I.

Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

Standard Steel Fabricating Co., Inc., 1640 W. Hanford St., Seattle 6, Wash.

Standard Steel Works Div. of the Baldwin Locomotive Works, Paschall P. O., Philadelphia 42, Pa.

Standard Tube Co., The, 14600 Woodward Ave., Detroit 3, Mich.

Stanley Works, The, New Britain & Bridgeport, Conn.

Stanwood Corp., 4825 W. Cortland St., Chicago 39, Ill.

Steel and Tubes Div. Republic Steel Corp., 226 E. 131st St., Cleveland 8, O.

Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, O.

Steel Improvement & Forge Co., The 942 E. 64th St., Cleveland 14, O.

Steel Parts Mfg. Corp. Div. of Blackstone Mfg. Co., 226 S. Morgan St., Chicago 7, Ill.

Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.

Sterling Grinding Wheel, The, Div. of The Cleveland Quarries Co., Tiffin, O.

Stewart-Warner Corp. Alemite Div., 1828 W. Diversey Parkway, Chicago 14, Ill.

Stokerunit Corp., 4548 W. Mitchell St., Milwaukee 14, Wis.

Strom Steel Ball Co., 1850 S. 54th Ave., Cicero 50, Ill.

Strong Steel Foundry Co., Hertel & Norris Aves., Buffalo 7, N. Y.

Struthers Wells Corp., Titusville, Pa.

Stuart, D. A., Oil Co., Ltd., 2735½ S. Troy St., Chicago 23, Ill.

Sturgis Products Co., Sturgis, Mich.

Sturtevant, B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston 36, Mass.

Sun Oil Co., Dept. 1, Philadelphia 3, Pa.

Sundstrand Machine Tool Co., 2540 Eleventh St., Rockford, Ill.

Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich.

Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

Superior Steel Corp., Carnegie, Pa.

Surface Checking Gage Co., 1937 Taft Ave., Hollywood 28, Cal.

Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.

Sutton Engineering Co., Bellefonte, Pa.

Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.

T

Taylor-Wharton Iron & Steel Co., Easton, Pa.

Taylor-Wilson Mfg. Co., Chamber of Commerce Bldg., Pittsburgh 19, Pa.

Taylor-Winfield Corp., Warren, O.

Texas Co., The, 135 E. 42nd St., New York 17, N. Y.

Thew Shovel Co., The, Lorain, O.

Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23, Pa.

Thomas Steel Co., The, Warren, O.

Thompson Grinder Co., Inc., 1534 W. Main St., Springfield, O.

Thomson Industries, Inc., 29-05 Review Ave., Long Island City 1, N. Y.

Tide Water Associated Oil Co., 17 Battery Pl., New York 4, N. Y.

Timken Roller Bearing Co., The, Canton 6, O.

Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.

Tinnerman Products Inc., 2039 Fulton Rd., Cleveland 13, O.

Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo 7, O.

Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

Topflight Tool Co., York, Pa.

Torrington Co., The, Torrington, Conn.

Towmotor Corp., 1223 E. 152nd St., Cleveland 10, O.

Tri-Boro Steel Supply Co., Inc., 620 Fifth Ave., New York 20, N. Y.

Triplex Screw Co., 5341 Grant Ave., Cleveland 5, O.

Truck-Man, Inc., 1410 W. Ganson St., Jackson, Mich.

Trumbull Electric Mfg. Co., The Plainville, Conn.

Tube Reducing Corp., Wallington, N. J.

Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.

Tubular Service Corp., 32 Boradway, New York 4, N. Y.

Tweco Products Co., Wichita 1, Kan.

U

Udylite Corp., The, 1651 E. Grand Blvd., Detroit 11, Mich.

Union Chain & Mfg. Co., Sandusky, O.

Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

Union Steel Castings Div. of Blaw-Knox Co., Pittsburgh 1, Pa.

Union Wire Rope Corp., 21st and Manchester Ave., Kansas City 3, Mo.

Unit Crane & Shovel Co., 6411 W. Burnham St., Milwaukee 14, Wis.

United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y.

United Engineering & Foundry Co., 1st Nat'l Bank Bldg., Pittsburgh 22, Pa.

U. S. Automatic Corp., Amherst, O.

United States Graphite Co., The, Saginaw, Mich.

United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York 20, N. Y.

United States Steel Corp., 436—7th Ave., Pittsburgh 30, Pa.

United States Steel Supply, P. O. Box M M, Chicago 90, Ill.

Upton Electric Furnace Div. Commerce Pattern Fdry. & Machine Co., 7450 Melville Ave., Detroit 17, Mich.

Utica Radiator Corp., Utica 1, N. Y.

V

Valley Mould & Iron Co., Hubbard, O.

Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

Vaughn Machinery Co., Cuyahoga Falls, O.

Veeder-Root, Inc., Hartford 2, Conn.

Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.

Vickers, Inc., 1480 Oakman Blvd., Detroit 32, Mich.

W

Waldron, John, Corp., New Brunswick, N. J.

Walker-Turner Co. Inc., 50123 Berckman St., Plainfield, N. J.

Wapakoneta Machine Co., The, Wapakoneta, O.

Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

Warren City Mfg. Co., Warren, O.

Washburn Wire Co., 118th St., & Harlem River, New York 35, N. Y.

Washington Steel Corp., 9. E. Beau St., Washington, Pa.

Wean Engineering Co., Inc., The, Warren, O.

Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.

Webb Corp., The, Webb City, Mo.

Weinman Pump & Supply Co., The, 207-209 Blvd. of the Allies, Pittsburgh 22, Pa.

Weirton Steel Co., Weirton, W. Va.

Wellman Engineering Co., The, 7000 Central Ave., Cleveland 4, O.

Wells Mfg. Corp., 1515 Filmore St., Three Rivers, Mich.

Wesche, B. A., Electric Co., The, 1628 Vine St., Cincinnati 10, O.

West Penn Machinery Co., 1208 House Bldg., Pittsburgh 22, Pa.

Westinghouse Electric Corp., Dept. 7-N, E. Pittsburgh, Pa.

Wheeling Steel Corp., Wheeling, W. Va.

Whitcomb Locomotive Co., Rochelle, Ill.

Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit 16, Mich.

Wickes Brothers, Saginaw, Mich.

Wickwire Spencer Steel Div., The Colorado Fuel & Iron Co., 500 Fifth Ave., New York 18, N. Y.

Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

Willson Products, Inc., 2nd & Washington Sts., Reading, Pa.

Wilson, Lee, Engineering Co., Inc., 20005 Lake Rd., Cleveland 16, O.

Wilson Welder & Metals Co., 60 E. 42nd St., New York 17, N. Y.

Wisconsin Motor Corp., Milwaukee 14, Wis.

Wisconsin Steel Co., 180 N. Michigan Ave., Chicago 1, Ill.

Wolff, Benjamin, & Co., 58th St. at Seeley Ave., Chicago 36, Ill.

Wood, R. D., Co., Public Ledger Bldg., Independence Sq., Philadelphia 5, Pa.

Worcester Pressed Steel Co., 501 Barber Ave., Worcester 6, Mass.

Worth Steel Co., Claymont, Del.

Wright Mfg. Div., American Chain & Cable Co. Inc., York, Pa.

Wrigley, Wm., Jr. Co., 410 N. Michigan Ave., Chicago 11, Ill.

Wrought Washer Mfg. Co., 2103 S. Bay St., Milwaukee 7, Wis.

Wyckoff Steel Co., P. O. Box 1256, Pittsburgh 30, Pa.

Wyman-Gordon Products Corp., Worcester 1, Mass.

Y

Yoder Co., The, 5500 Walworth Ave., Cleveland [illegible]

Youngstown [illegible] Tube Co., The, Youngsto[illegible]

Youngstown [illegible]ding & Engineering Co., 711 Oakwood Ave., Youngstown 9, O.

Z

Zeh & Hahnemann Co., 56 Avenue A, Newark 5, N. J.